NAVY MEDICAL CARE STUDY PLANNING AND PROGRAMMING

Phase II

BY
JOHN J. WAGGONER
KEN W. McCARTY

AUGUST 1974

THE CONSULTING DIVISION
BOEING COMPUTER SERVICES, INC.
505 BAKER BOULEVARD
SEATTLE, WASHINGTON 98188

This work was conducted for the
Office of Naval Research, Office of
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The relationship between the size and composition of beneficiary populations and output levels is analyzed in detail. The results indicate that workload projections can be made accurately based on the size and growth of different population segments. Further cost analysis is performed to determine the total and marginal costs of medical care applicable to various program elements and appropriation categories.

FOREWORD

This document is part of the final report of The Boeing Computer Services, Inc (BCS) study titled "Research on the Efficient Delivery of Medical Care in the U.S. Navy." The report summarizes the work accomplished from January-August 1974 under the contract N-0014-73-C-0341 for the Office of the Chief of Naval Operations under the direction of the Support Forces, Manpower Logistics Branch (OP 964) of the Systems Analysis Division. Further analysis and background information has been reported earlier in Navy Medical Care - Findings and Implications and Costs and Economic Efficiency. Navy responsibility for all this work was vested in Dr. A. S. Rhode, Mr. Irwin Schiff and Lt. Eleanor Matheson, who was the project officer.

The Bureau of Medicine and Surgery provided most of the data for this study. They also aided us considerably in understanding the data and the systems we were attempting to analyze. We very much appreciate their cooperation.

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EXECUTIVE SUMMARY

The Consulting Division of Boeing Computer Services Inc. has completed the second phase of our contract "Research on the Efficient Delivery of Medical Care in the U.S. Navy" under contract number N-0014-73-C-0341 for the Systems Analysis Division, Office of the Chief of Naval Operations, directed by Support Forces, Manpower and Logistics Branch (OP-964). The goals of this study were to identify those factors that determined the level of output for health care services and to analyze the resultant costs both within the current program classification structure and within one that is more meaningful for long range planning and programming. The detailed data and analysis are included in our final report Navy Medical Care Study Planning and Programming and its appendices.

The methodology or framework for the analysis that was adopted was one of relating the population size to the output levels and then estimating the relationship between the level of output and the total expenses reported. The population was related to the output levels by using the historic utilization rates for the different beneficiary segments. We relied heavily on the work of BUMED with some minor modifications. We feel that these projections are accurate as long as the incentives embodied in the current delivery of medicine remain constant (among them the zero price, unlimited sick leave, and budget justifications based on reported workload). The cost analysis was based on the same technique as was used in our earlier report Navy Medical Care Study Costs and Economic Efficiency: cross-sectional regression analysis. However, further detail is added here in the form of marginal costs estimates which are applicable to the various program elements and appropriation categories (OMN and MPN).

To summarize the results of the average cost analysis, we have taken Figure 3-8, Analysis of OMN and MPN Expenditures for Health Care Outputs, from our main report. The data employed in this analysis was for the first three quarters of the fiscal year 1974. Seven outputs were recognized for the Navy Health Care: inpatient care, outpatient care, dental and ophthalmic care, public health, research, training, and administration. The total expenses for each of these categories both in Navy facilities and through CHAMPUS as well as

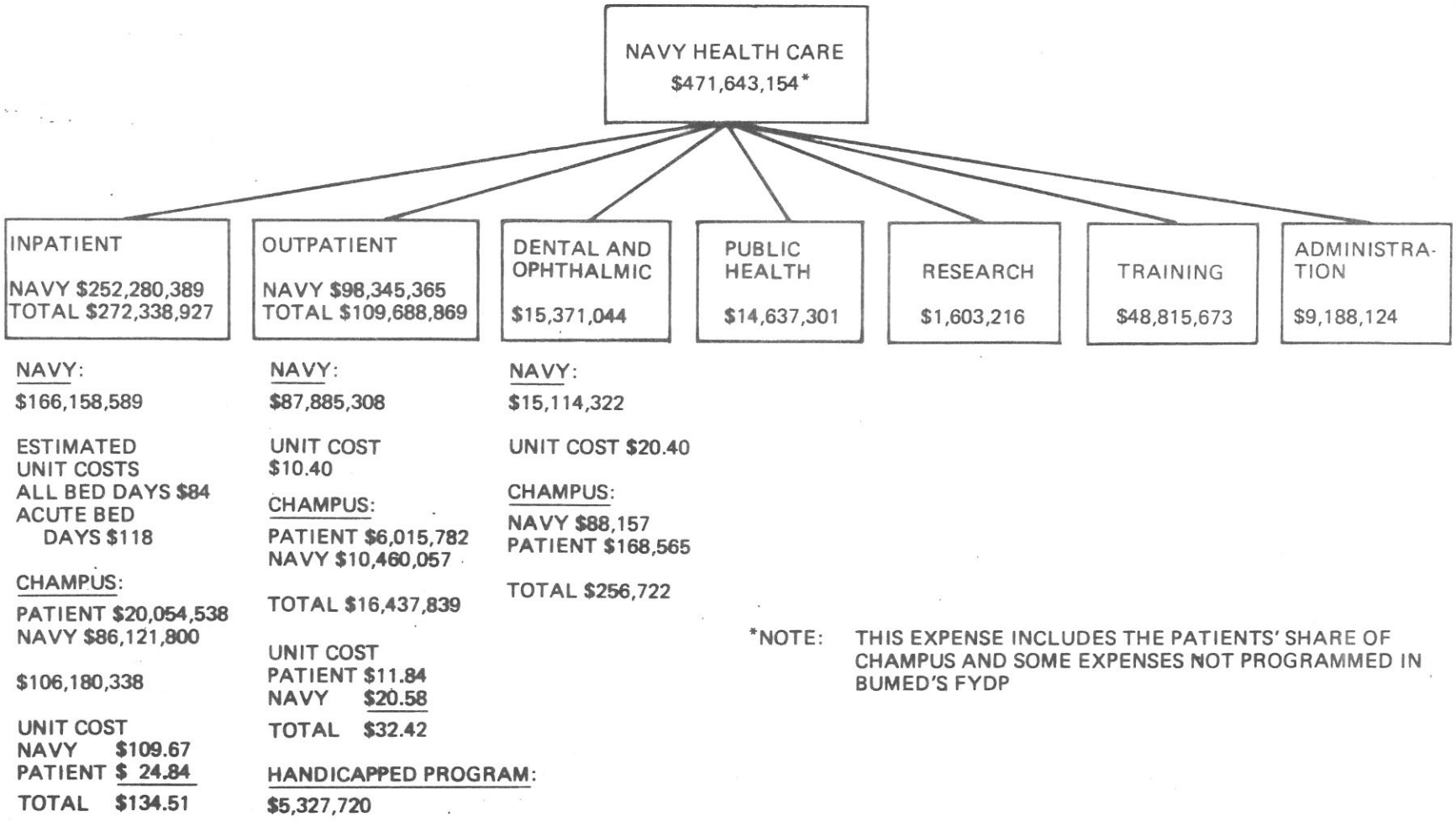


FIGURE 3-8 ANALYSIS OF OMN AND MPN EXPENDITURES FOR HEALTH CARE OUTPUTS (FY 74, FIRST THREE QUARTERS)

the unit cost for inpatient, outpatient, and dental care are reported on the Figure. Only the direct expenses are included within those estimates.

However, as we argued in the report, two of the functions identified in Figure 3-8, training and administration, are not final goals in themselves but are inputs to the other productive functions. After allocating the expenses for training and administration (and taking account of the fact that not all of the training nor administration is for the Navy Hospitals, but some is for the benefit of the fleet), new costs for the final outputs were estimated. There are shown on Figure 3-9, Analysis of OMN and MPN Expenditures for Final Health Care Outputs. Again the unit costs for inpatient, outpatient, and dental care are reported. Not shown on these two Figures but included within our report are the marginal cost estimates for inpatient, outpatient, and dental care, as well as training.

This analysis, while employing a somewhat different approach than our earlier work (training, administration, and downtime are treated as separable items), tends to confirm the results and is reported therein. Again we conclude that the cost of military medical services, whether they be inpatient or outpatient, are approximately the same as in the civilian sector. The marginal cost estimates tend to confirm those reported earlier. And again the problem exists that much higher levels of medical and dental services are being provided to the active duty population than to other Federal employees or to the civilian population as a whole. It appears that this situation is allowed to exist not from some explicit policy decision but by default.

We have concluded that further work needs to be done. The first requirement is the quantification of the impact of the mission constraint on Navy health care. The inventory of medical resources required both to maintain a viable force and to assure that any contingency role could be fulfilled has not been specified. If it is much higher than the peacetime requirements, programs should be developed to encourage greater use of military medical services in lieu of CHAMPUS. Otherwise, in peacetime there will be idle resources. On the other hand, if the mission constrained inventory is relatively small, other alternatives can be considered. A second problem

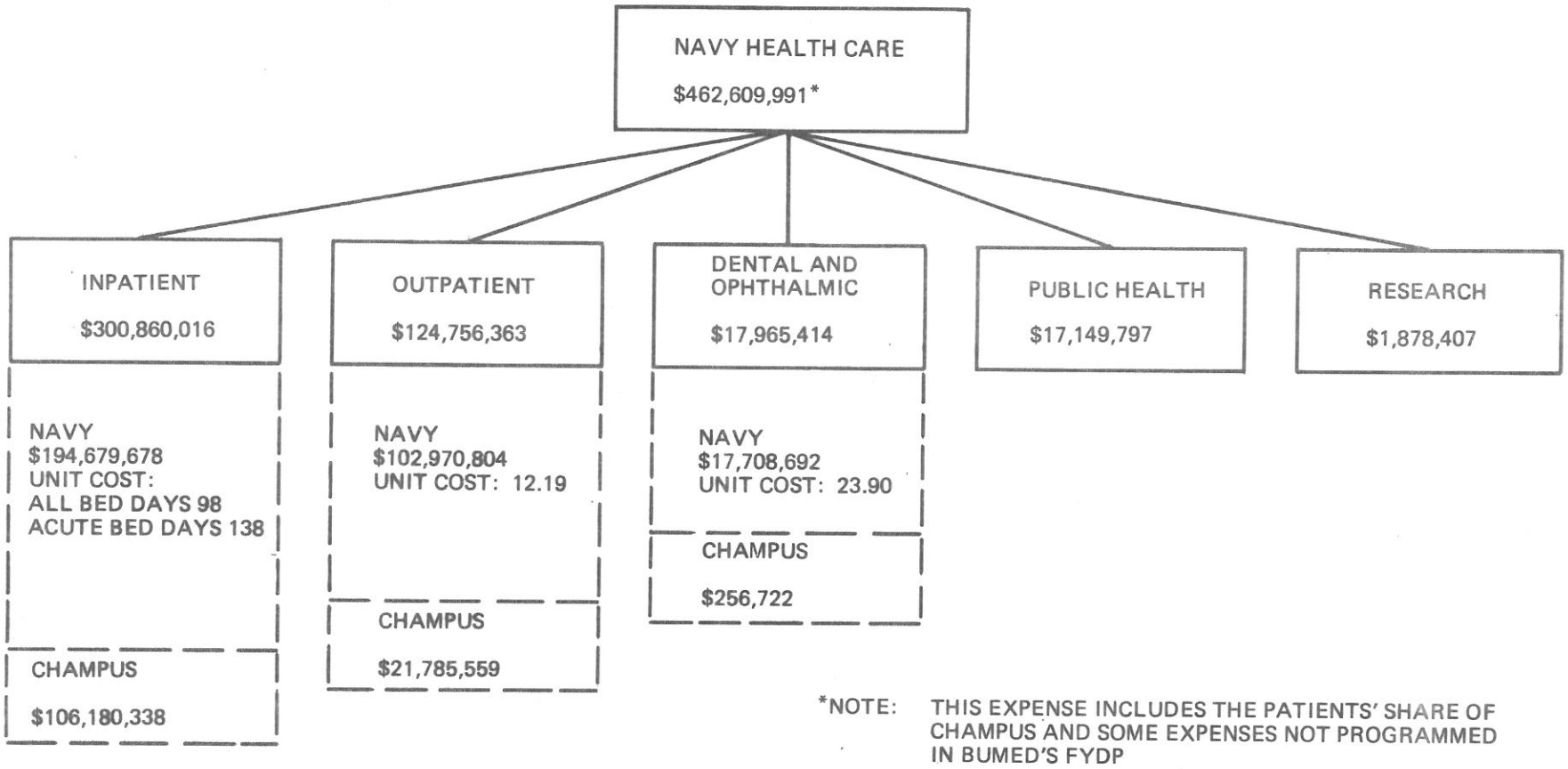


FIGURE 3-9 ANALYSIS OF OMN AND MPN EXPENDITURES FOR FINAL HEALTH CARE OUTPUTS (FY 74, FIRST THREE QUARTERS)

we have recognized is that the information system is not sufficiently powerful to provide much of the data required for the day-to-day management of the Navy health care delivery system or to support the numerous special studies of military medicine. This results in too many hand calculations, excessive administrative workloads, and frequent management problems in the retirement system due to the lack of documentation. A third area that merits further research is the impact of capital, especially in light of the significant change in the relative price of military physicians. Because capital is budgeted separately from MPN and OMN dollars, expenditures for it are seldom justified in terms of a reduction in the level of these other appropriations. This should be one basis for future capital decisions.

1.0 INTRODUCTION

Previous research conducted by The Consulting Division of Boeing Computer Services was directed to improving cost estimates for providing inpatient and outpatient care in Navy medical facilities. The determinants of demand by the active duty personnel and the civilian beneficiaries were also considered and identified as a major problem area. That study concluded that the cost of producing medical services was approximately the same in the civilian and military sector but that there were potential cost savings if demand could be controlled. One potential method to do so would be to provide more care through the Civilian Health and Medical Program For Uniformed Services (CHAMPUS) for the civilian beneficiaries. If this were to occur, then demand would be reduced due to the cost sharing provisions of CHAMPUS. A second alternative would be to introduce a co-payment for care provided by the Navy in its outpatient facilities. The demand for inpatient and outpatient care by active duty personnel was also found to be much higher than in the civilian sector; it was suggested that this could be reduced through changes in administrative procedures and perhaps limitations on the amount of sick leave. Again the basic requirement to control utilization is to face the consumers with some positive price. The second set of incentives considered were those of the providers. From discussions included in our earlier reports it was concluded that funding should not be based on workload reported but rather on capitation methods as are employed now for health maintenance organizations.

The study's findings and the report were not complete for a number of reasons. First of all, only two outputs were recognized -- those of inpatient and

outpatient services. The cost for the excluded categories was termed "unallocated expenses" and the outputs were neither specifically recognized nor measured. Included among these outputs were dental care, preventive medicine and public health, research, and much of the training. Additionally, if substantial reprogramming changes were to be required in the future (either because changes in the source of care due to shifts in administrative policy, failure to recruit adequate numbers of physicians, or in the strength of the Navy), much of the needed information for making the new resource allocations had not been developed. For example, the source of funds by program elements was not identified. Neither were the appropriation categories such as operations and maintenance (OMN) and military personnel (MPN). Additionally, if the policy changes were to be implemented, their primary impact would be uncertain because the resources allocated to the subpopulations receiving benefits are not fully identified. For all of the above reasons further work was required.

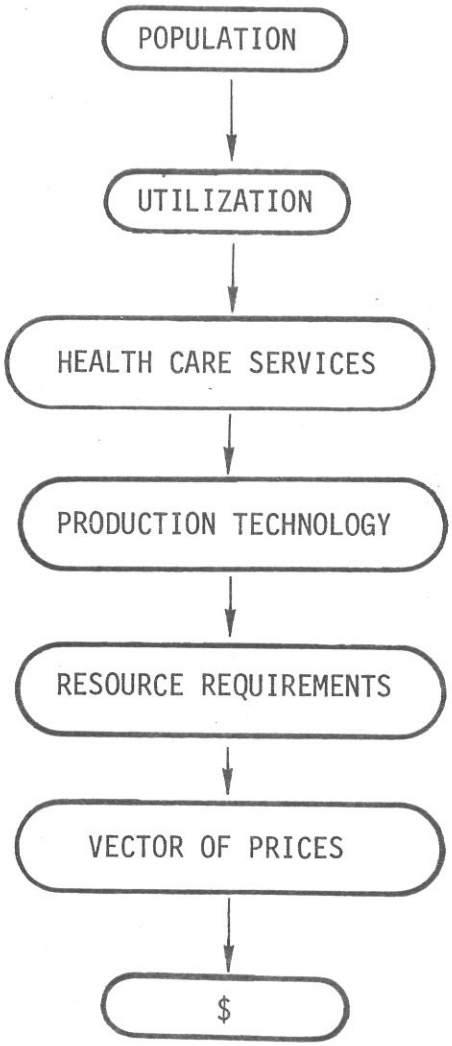
The current study on which we are reporting is designed to fulfill a number of goals. The first of these is to identify the additional functions for which the Bureau of Medicine and Surgery (BUMED) makes expenditures. The beneficiaries of these functions should be determined and if possible the outputs quantified. A second goal is to identify the "driving factors" which relate the required levels of output to the force strength and the number of civilian beneficiaries. This has been done and will be reported both on a theoretical and state-of-the-arts level. Adequate programming requires that these outputs be translated into resource requirements. This has been done, with the resources identified by appropriation category (i.e., the mix between OMN and MPN

dollars). Further, the identification must specify the source of the funds or the program element to which the resources should be allocated. Finally, a new program classification structure can be employed as an evaluation tool. It should present the cost and output data for the different functions of the Navy Medical Department and identify the beneficiary groups that consume the end products.

A model that depicts the demand and supply elements of this production process and describes the approach that we have adopted is shown on Figure 1-1. It has seven distinct elements that in large part have been derived from some of the structures used for regional medical planning in the civilian sector. (For example, see Yett, Donald E. et al, "A Macro Econometric Model for Regional Health Planning" Economic and Business Bulletin, Fall 1971.) The first element is to identify the population. It must be specified in groups that have similar utilization rates. Within the Navy, this requires identification of several beneficiary groups: active duty, active duty dependents, retired personnel, and the dependents of the deceased and retired personnel. More specific identification of the active duty population should include pilots and those undergoing advanced individual training, shipboard subpopulations, members of the Marine Corps, and perhaps general support. The civilian beneficiaries may be viewed as a function of the active duty population (for example, with dependents of the active duty personnel) or treated separately in a manner similar to that which is described below for the active duty personnel. The second element, the utilization rates, translates the population's numbers into the level of demand for health care services. These include only the final demands, not intermediate goods such as

FIGURE 1-1

SUPPLY AND DEMAND ELEMENTS - NAVY MEDICAL CARE



training that depend on the level of outputs of the health care delivery system. These final outputs are then mapped into the resource requirements by the production function. This production function must specify the resources required to produce a unit of each of the health care services. The resources themselves must be defined uniquely by program element and appropriation category. In some sense, this distinction is arbitrary, since it is the availability of the resource that is important, not its source. However, for programming within the Five Year Defense Plan, it is also necessary to specify the program element and the appropriation category. If these resources do require that some intermediate goods be produced, e.g., the training of physicians and corpsmen, then these secondary demands have to be treated separately. Our approach to that problem will be discussed below. Finally, the resource requirements may be translated into the required dollars through the use of a vector of prices. In reality, our approach collapses these last two steps into one because the resource requirements were initially specified in terms of dollars. That is, instead of the production technology identifying the number of manhours by occupational specialty required to produce a unit of final demand, it specifies the MPN dollar requirements directly. This approach is a matter of both convenience and ease of calculation, and it also allows implicit tradeoffs to occur in the production technology that we do not have to specify.

The above methodology also can be extended to describe the production of the intermediate goods. This is almost exclusively training. This results because the Navy does not merely hire individuals from the civilian sector who have the required skills, and pay the competitive price, but

rather recruits those with lesser or not completely developed skills and then, through training, develops the required skill specialties to meet the Navy's manpower requirements. The total demand for manpower is derived from the required levels of output of the final services. Not all of the manpower resources required would have to be trained, as there is a continuance from past years. The number that would have to be trained would be the difference between the total requirements for the next year and the strength in each occupational specialty which will continue to be on active duty in that year. Again, the resources that are needed to satisfy the training requirements are determined by the production technology. These resource requirements should include the cost of the student's time and must be identified by appropriation category and program element. Hence the systems approach that has been developed to describe the determination of the resource requirements for final products is also applicable to those intermediate products, i.e., the training.

There are additional resources besides those appropriated in the MPN and OMN categories with which we did not deal directly. These are resources that are allocated for capital and research. Capital budgeting is extremely difficult to deal with in the framework that has been described to this point. The reason is that capital investment should be made based on a cost benefit analysis, i.e., based on the rate of return of that capital, whether it be monetary or non-pecuniary benefits. However, in order to complete that calculation detailed inspection of the current capital facilities is required. The impact of alternative configurations of plant and equipment on the OMN dollars required also must be predicted. For example, a decision on whether to provide a physician two, three, four or more examining rooms should be made in part based on the impact of these

capital expenditures on the operating expenses of delivering outpatient care. Then, using these alternative amounts of capital, it is necessary to determine the cost of producing similar amounts of outpatient services. This implies there must be some substitution of capital expense for operating expense. However, since the benefits of these capital expenditures will not accrue in only one year but rather over an extended span of time, future benefits must be discounted so that a comparison can be made. We have neither the time nor the resources to develop the data on which to base capital recommendations. The inventory lists that we have seen are not adequate to determine the current configurations of plant and equipment, and we have not investigated the impact of alternative amounts of capital on the operating expenses. This would be both an interesting and valuable future project.

The second appropriation category that we did not investigate completely is that of research. However, this too must be viewed as capital investment (although it may have some retention value also) whose future benefits can only be conjectured. As with physical or human capital, these projects should be evaluated individually, again taking account of the expected future benefits and the certain present costs. Because these benefits are even less certain than the impact that physical capital expenditures has on operating expense, this analysis would be more difficult to complete. Therefore we have not included any "driving factors" analysis to determine at what level research should be funded. Instead we have described the current level of expenditures and the projects that are being supported.

We have prescribed a two-step procedure for determining resource requirements. The first step is to estimate the level of outputs required. The second is to cost these outputs, including both fixed and marginal costs. The major part of our analysis is presented in the following two chapters. Chapter 2.0 discusses how forecasts of future demand are currently being made and what improvements are possible. It also discusses variables which, while not explicitly accounted for here, must be considered in implementing alternatives such as increased employment of the civilian sector to provide health care services to Navy beneficiaries. Chapter 3.0 then analyzes how costs vary at military facilities as the level of the following outputs is changed: inpatient care, outpatient care, dental care, and training. Data to support the analysis contained in these two chapters is included in appendices.

2.0 DRIVING FACTORS ANALYSIS

In order to program the required resources for the delivery of health care, it is first necessary to determine the required level of output for both the final services and the intermediate products such as training. There are many determinants of the level of final demand and no analysis can include all of them nor treat equally those factors that are included. Additionally, not all of the data elements exist to permit all factors to be specifically taken into account. Rather averages must be used, which does imply some increase in the probability error of the final estimates. Because of these problems, we will discuss both the "state of the art" -- presenting methodology, data, and their sources -- and recommendations concerning data elements that should be collected and analyses that should be developed to improve these predictions. We will follow the lead that was established in Chapter 1.0, i.e., that of determining the output that must be produced to satisfy the demand of the population by considering historic utilization patterns. Some data adjustment will be required and estimates will have to be derived. Comparisons will be made with the civilian sector, both as an evaluation technique and to estimate the impact of alternative policies on the utilization of medical services.

2.1 INPATIENT AND OUTPATIENT MEDICAL SERVICES

The problem of determining the required level of medical services, both for inpatient and outpatient care, should be viewed as that of relating the population size to various levels of output. As part of the budget

submittal process the Bureau of Medicine and Surgery (BUMED) has developed this historic pattern of utilization from 1969 projected through 1975. Because we think this is a good approach and a good starting point, we have included copies of their worksheets as Tables 2-1 through 2-8. Table 2-1 reports the average daily inpatient load for active duty Navy and Marine Corps personnel. The utilization rate for the population must be calculated by one of two approaches. Either the Navy subpopulation supported only by Navy medical facilities must be identified (thus excluding Naval personnel supported by Army, Air Force, or non-service facilities), or the amount of care provided to Navy and Marine Corps personnel in Army, Air Force, and non-service facilities must be determined. The latter approach provides the most complete and accurate estimates and has been employed by BUMED. For each year the average daily patient load for this population group is reported for Navy facilities (hospitals and medical centers as well as dispensaries and the fleet), Army facilities, Air Force facilities, and non-service facilities (the VA, Canal Zone, and public health hospitals). For example in 1969 the average daily inpatient load from all of the above sources was 12,983 patients per day. For that year active duty Navy and Marine Corps strength was 1,070,858. This implies that each day of that year an average of 12.12 individuals for each 1,000 population were hospitalized (that is[12,983 ÷ 1,070,858]* 1000).

In reviewing Table 2-1, it is interesting to note that the hospitalization rate monotonically declied between 1969 and 1973. The reason for this trend was the decreasing number of Navy and Marine Corps battle casualties throughout this period. Apparently BUMED does not believe that this

trend will continue, since their projection for 1974-1975 uses a constant hospitalization rate.

The hospitalization rate is useful for projecting the future workload that will be generated by Navy and Marine Corps active duty personnel. However, additional workload results from providing services to Army and Air Force personnel. The past Army/Air Force workloads and those projected for the future, are shown on the last two columns of Table 2-1. Future projections are not based on the population supported; rather these estimates are based on recent years' averages.

Similar work sheets are developed for the dependents of active duty, retired personnel, and the dependents of the retired personnel. Exactly the same format is used; again hospitalization rates are calculated as the average daily patient load per thousand population members. These historic rates, however, are somewhat easier to interpret as they do not include the effects of battle casualties as shown for active duty personnel. For example, in Table 2-2, the average daily patient load for the dependents of the active duty personnel shows hospitalization rates that do not fluctuate greatly. For the years 1969 through 1973, the mean hospitalization rate averages 3.16 occupied bed days. The variance of this range is only .003; the standard error is equal to .057 or approximately 1.8 percent of the mean. Hence for these five years this hospitalization rate has accurately predicted the patient workload. Table 2-3 indicates the average daily patient load for the retired Navy and the Marine Corps personnel, and again we see that the hospitalization rate has only fluctuated over a narrow range. The mean for

TABLE 2-1 AVERAGE DAILY PATIENT LOAD — ACTIVE DUTY PERSONNEL

FISCAL YEAR	NAVY & MARINE CORPS: Active Duty IN:											ARMY & AF: Active Duty IN NAVY HOSPS OF MED. CTRS.	
	Nav. Hosp. Med. Ctr.	Other Navy Disp.			Army Fac.	AF Fac.	Non-Serv. Fac.	CHAMPUS	TOTAL	POPULATION	HOSP. RATE Per 1,000	Army	Air Force
		Fleet	Naval	Other									
1969	9,785	1351		503	814	251	279		12,983	1,070,858	12.12	914	201
1970	7,991	861		436	507	140	275		10,210	1,027,223	9.94	810	175
1971	5,973	292		311	428	105	176		7,285	889,753	8.19	609	165
1972	4,583	133		261	277	85	156		5,495	805,990	6.82	378	168
1973	4,591	88		75	260	96	161		5,271	776,322	6.79	199	154
Adjustments:													
Regionalization	+10			-10									
Albany	+3			-3									
1973 ADJ.	4,604	88		62	260	96	161		5,271				
1974 EST.	4,552	87		61	255	95	159		5,211	767,262	6.79	197	152
Albany	+3			-3									-3
1974 ADJ.	4,555	87		58	255	95	159		5,211				149
1975 EST.	4,490	86		57	255	96	157		5,136	756,291	6.79	197	147

TABLE 2-2 AVERAGE DAILY PATIENT LOAD — ACTIVE DUTY DEPENDENTS

FISCAL YEAR	NAVY & MARINE CORPS: DEPENDENTS of ACTIVE DUTY IN:								TOTAL	POPULATION	HOSP. RATE Per 1,000	ARMY & AF: DEPENDENTS of ACTIVE DUTY IN NAVY HOSPS of MED. CTRS.	
	Nav. Hosp. Med. Ctr.	Other Navy			Army Fac.	AF Fac.	Non-Serv. Fac.	CHAMPUS				Army	Air Force
		Fleet	Disp. Naval	Other									
1969	1,051			61	198	120	66	1,504	3,000	979,139	3.06	106	120
1970	1,000			55	197	126	66	1,562	3,006	942,213	3.19	101	110
1971	1,041			44	181	108	57	1,492	2,923	904,883	3.23	96	102
1972	971			33	165	95	60	1,523	2,847	904,921	3.15	87	97
1973	915			30	156	94	62	1,611	2,868	900,577	3.18	73	97
Adjustments: Army Closures					-3			+3					
AF Closures						-1		+1					
Navy Closures	-6							+6				-5	-6
Albany	+8			-8									
1973 ADJ.	917			22	153	93	62	1,621	2,868			68	91
1974 EST.	921			22	154	93	62	1,628	2,880	905,626	3.18	68	91
Navy Closures	-4							+4				-2	-7
Albany	+7			-7									
1974 ADJ.	924			15	154	93	62	1,632	2,880			66	84
1975 EST.	910			15	151	91	61	1,607	2,835	891,669	3.18	65	83

TABLE 2-3 AVERAGE DAILY PATIENT LOAD — RETIRED PERSONNEL

FISCAL YEAR	NAVY & MARINE CORPS: RETIRED IN								TOTAL	POPULATION	HOSP. RATE Per 1,000	ARMY & AF: RETIRED IN NAVY HOSPS of MED. CTRS.	
	Nav. Hosp. Med. Ctr.	Other Navy Disp.			Army Fac.	AF Fac.	Non-Serv. Fac.	CHAMPUS				Army	Air Force
		Fleet	Naval	Other									
1969	552			4	86	90	97	171	1,000	241,078	4.15	125	70
1970	556			4	84	92	92	206	1,034	254,863	4.06	133	1
1971	565			3	106	96	80	262	1,112	267,488	4.16	129	78
1972	600			3	105	94	56	327	1,185	282,617	4.19	156	88
1973 ACT	567			3	109	95	68	340	1,182	296,440	3.99	144	86
Army Closures					-4			+4					
AF Closures						-1		+1					
Albany	+1			-1									
Navy Closures	-30							+30				-17	-8
1973 ADJ.	538			2	105	94	68	375	1,182			127	78
1974 EST.	566			2	110	99	72	395	1,244	311,731	3.99	134	82
Albany	+1			-1									
Navy Closures	-14					+1		+13				-7	-4
1974 ADJ.	553			1	110	100	72	408	1,244			127	78
1975 EST.	577			1	115	104	75	425	1,297	325,157	3.99	132	81

the five years 1969 through 1973 was 4.11, the variance was equal to .005 and the standard error was .08, approximately 1.8 percent of the mean value. Here again, during this five-year period, the hospitalization rate has accurately predicted the workload generated by the retired population. Table 2-4 shows the average daily patient load for the dependents of the retired and deceased population. Here the hospitalization rate has fluctuated much more widely and hence has not been nearly as satisfactory a predictor. For 1969 through 1973 the mean rate has been 3.418, the variance has been .11, and the standard error has been .33 or almost 10 percent of the mean value. It should be pointed out that the population estimates themselves are not actuals in any sense but are merely predicted from the size of the retired population. For each year, the size of the retired dependent population has in fact been estimated to be 1.8 times the number of retired personnel. This estimate was based on a survey conducted in the 1950's. Recently (after the construction of these tables) the estimate was altered. BUMED has been directed by OSD to base future tables on the estimate of 2.66 dependents per retired Navy and Marine Corps personnel.

Tables 2-5 through 2-8 show the historic pattern of utilization for outpatient visits in somewhat the same format as was used for inpatient care. However, there is some difference. The average daily outpatient visits are reported for active duty Navy and Marine Corps personnel (on Table 2-5) only for Navy and other non-service facilities. The care provided by the Army and the Air Force to Navy beneficiaries is not accounted for. As a result, the outpatient visit rate per thousand is understated by the amount of care that the other services provide to the Navy. The

TABLE 2-4 AVERAGE DAILY PATIENT LOAD — RETIRED DEPENDENTS

FISCAL YEAR	NAVY & MARINE CORPS: DEPENDENTS of RETIRED IN								TOTAL	POPULATION	HOSP. RATE Per 1,000	ARMY & AF: DEPENDENTS of RETIRED IN NAVY HOSPS of MED. CTRS.	
	Nav. Hosp. Med. Ctr.	Other Navy			Army Fac.	AF Fac.	Non-Serv. Fac.	CHAMPUS				Army	Air Force
		Fleet	Disp. Naval	Other									
1969	403			0	97	99	41	641	1,287	433,940	2.97	93	64
1970	415			5	102	103	42	775	1,442	458,755	3.14	101	73
1971	436			4	108	102	43	956	1,649	481,478	3.42	110	86
1972	470			5	108	102	44	1,173	1,902	508,710	3.74	125	94
1973	459			3	107	101	45	1,325	2,040	533,592	3.82	123	97
Army Closures					-6			+6					
AF Closures						-2		+2					
Albany	+1			-1									
Navy Closures	-18							+18				-14	-7
1973 ADJ.	442			2	101	99	45	1,351	2,040			109	90
1974 EST.	465			2	108	106	48	1,459	2,188	561,116	3.90	117	96
Albany	+1			-1									
Navy Closures	-10					+1		+9				-4	-5
1974 ADJ.	456			1	108	107	48	1,468	2,188			113	91
1975 EST.	476			1	115	114	51	1,572	2,329	585,283	3.98	120	97

TABLE 2-5 OUTPATIENT VISITS — ACTIVE DUTY PERSONNEL

FISCAL YEAR	ACTIVE DUTY NAVY & MARINE CORPS IN -							TOTAL	NAVY & MC AC. DUTY STRENGTH	O/P VISIT RATE (Per 1,000)	ARMY & AF ACTIVE DUTY IN IN NAVAL HOSPS OR MED CTR	
	Navy Hosps. & Med. Ctrs	OTHER NAVY			NON-SERVICE FACILITIES						Army	AF
		Fleet	Navy Disp	Other Disp	V. A.	C. Z.	Civilian					
1969	2,865	10,151	650	9,345	12	5	140	23,168	1,070,858	21.63	145	102
1970	3,153	8,969	673	9,696	14	6	153	22,664	1,027,223	22.06	152	98
1971	3,322	7,036	538	8,921	13	7	156	19,993	889,753	22.47	151	109
1972	4,043	6,226	330	7,338	16	9	159	18,121	805,990	22.48	157	130
1973	8,750	6,176	199	2,519	18	15	155	17,832	776,322	22.97	165	144
Adjustment:												
Regionalization	+958		+199	-1,157							+19	+ 9
Albany	+18			- 18							+ 1	+ 1
1973 ADJ.	9,726	6,176	398	1,344	18	15	155	17,832			185	154
1974 EST.	9,613	6,104	393	1,328	18	15	153	17,624	767,262	22.97	183	152
Albany	+ 17			- 17								
1974 ADJ.	9,630	6,104	393	1,311	18	15	153	17,624			183	152
1975 EST.	9,492	6,017	387	1,292	18	15	151	17,372	756,291	22.97	180	150

seriousness of this understatement will be discussed elsewhere. We can still evaluate, using the same criteria employed earlier, the outpatient visit rate as a predictor of the amount of care that has been provided to the active duty personnel. For 1969 through 1972 the mean rate was 22.32 outpatient visits per day per thousand population. The variance is equal to .158 and the standard error equal to .4, or approximately 1.8 percent of the mean outpatient visit rate. For the dependents of the active duty Navy and Marine Corps (shown on Table 2-6) there again is the problem that the outpatient visits provided for this population in the Army and Air Force facilities are not recorded, with the same result that the outpatient visit rate per thousand is understated. That rate itself fluctuates over wider bounds than does the number of outpatient visits reported for the active duty personnel. Again employing our evaluation criteria, the mean for 1969 through 1973 has been 13.36 visits per thousand per day, the variance has been 6.15, and the standard error 2.5 or approximately 18.7 percent of the mean of the sample. We can also note that there has been an increasing trend in reported outpatient visits during this five-year period. The Bureau of Medicine and Surgery has assumed that the trend will continue. Tables 2-7 and 2-8 report the outpatient visits for the retired Navy and Marine Corps personnel, and their dependents, as well as those of the deceased. These tables have the problem that was mentioned in connection with the active duty personnel and their dependents. In addition there is a second problem: the care provided to Army and Air Force personnel and their dependents is included as part of that reported being provided to the Navy and Marine Corps beneficiaries. These problems tend to offset each other. The rates themselves for both of these tables have not been as stable as those

TABLE 2-6 OUTPATIENT VISITS — ACTIVE DUTY DEPENDENTS

FISCAL YEAR	DEPENDENTS OF ACTIVE DUTY NAVAL & MARINE CORPS IN —							TOTAL	STRENGTH	O/P VISIT RATE (Per 1,000)	ARMY AND AIRFORCE DEPENDS. OF ACTIVE DUTY IN NAVAL HOSP. OR MED. CTRS.	
	Navy Hosps. & Med Ctrs	OTHER NAVY FACILITIES			NONSERVICE FACILITIES							
		Fleet	Navy Disp.	Other Disp.	C. Z.	Champus Med.	Champus PSI					
1969	7,519	40	602	3421	13	354	(176)	11,949	979,137	12.20		TOTAL 981
1970	7,595	4	575	3524	15	405	(204)	12,118	942,213	12.86		1030
1971	8,066	4	569	3531	19	349	(178)	12,538	904,883	13.86		1076
											Army	AF
1972	9,310	8	149	2911	23	390	(208)	12,791	904,921	14.13	539	560
1973	10,524	11	212	1721	30	675	(353)	13,173	900,577	14.63	529	599
Adjustment:												
Regionalization	+ 415		+212	- 627							+27	+ 39
Closures St. Albans	- 10					+ 10					-13	- 7
Boston	- 10					+ 10					- 6	- 8
Army/AF						+ 10		+ 10				
Albany	+ 47			- 47							+ 4	+ 5
1973 ADJ.	10, 966	11	424	1047	30	705	(353)	13,183	900,577	14.64	541	628
1974 EST.	11,247	11	435	1074	31	723	(355)	13,521	905,626	14.93	555	645
Closures St. Albans	- 10					+ 10					-12	- 7
Boston	- 16					+ 16					-10	- 11
Albany	+ 47			- 47							+ 3	+ 5
1974 ADJ.	11,268	11	435	1027	31	749	(355)	13,521	905,626	14.93	536	590
1975 EST.	11,317	11	437	1031	31	752	(350)	13,579	891,669	15.23	536	590

TABLE 2-7 OUTPATIENT VISITS — RETIRED PERSONNEL

FISCAL YEAR	Navy Hosps. & Med. Ctrs.	RETIRED NAVY & MARINE CORPS IN – OTHER NAVY		NONSERVICE FACILITIES			TOTAL	STRENGTH	O/P VISIT RATE – (Per 1,000)
		Navy Disp.	Other Disp.	VA	Champus Med.	Champus PSI			
1969	1,042	84	268	19	111	(18)	1,524	241,078	6.32
1970	1,173	71	317	28	144	(25)	1,733	254,864	6.80
1971	1,363	70	317	27	188	(34)	1,965	267,488	7.35
1972	1,697	67	310	34	242	(47)	2,350	282,617	8.32
1973	2,104	3	195	41	232	(42)	2,575	296,440	8.69
Adjustment:									
Regionalization	+ 55	+3	-58		+27				
Closures St. Albans 50%	- 27				+27				
Boston 40%	- 19				+19				
Albany	+ 7		- 7						
1973 ADJ.	2,120	6	130	41	278	(42)	2,575	296,440	8.69
1974 EST.	2,333	7	143	45	306	(44)	2,834	311,731	9.09
Closures St. Albans 50%	- 27				+27				
Boston 40%	- 29				+29				
Albany	+ 6		- 6						
1974 ADJ.	2,283	7	137	45	362	(44)	2,834	311,731	9.09
1975 EST.	2,500	8	150	49	396	(46)	3,103	325,157	9.54

TABLE 2-8 OUTPATIENT VISITS — RETIRED DEPENDENTS

FISCAL YEAR	DEPENDENTS OF RETIRED NAVY & MARINE CORPS IN -					TOTAL	STRENGTH	O/P VISIT RATE (Per 1,000)
	Navy Hosps. Med. Ctrs.	OTHER NAVY		NONSERVICE FACILITIES				
		Navy Disp.	Other Disp.	Champus				
				Med.	PSI			
1969	1,683	102	466	448	(114)	2,699	433,940	6.22
1970	1,911	104	507	590	(152)	3,112	458,755	6.78
1971	2,340	86	545	861	(230)	3,832	481,478	7.96
1972	2,695	75	460	1,163	(380)	4,393	508,710	8.64
1973	3,274	8	342	890	(221)	4,514	533,592	8.46
Adjustment:								
Regionalization	+ 96	+8	-104					
Closures St. Albans	- 49			+49				
Albany	+ 15		-15					
Boston	- 33			+33				
1973 ADJ.	3,303	16	223	972	(221)	4,514	533,592	8.46
1974 EST.	3,482	17	235	1,024	(232)	4,758	561,116	8.48
Closures St. Albans	- 48			+48				
Boston	- 49			+49				
Albany	+ 14		-14					
1974 ADJ.	3,399	17	221	1,121	(232)	4,758	561,116	8.48
1975	3,574	18	232	1,179	(244)	5,003	585,283	8.55

discussed just previously. In both cases, the standard error of the hospital rate has been in excess of 12 percent of the mean of the hospital outpatient visit rate. Additionally, for the retired personnel we know that there has been an increasing trend in the number of outpatient visits, which is projected to continue. This is not true of the dependents of the retired Navy and Marine Corps personnel.

The workload predictors have been less accurate for the retired personnel and their dependents and those of the deceased personnel than for the other beneficiary groups. Certainly, an improvement is called for. But we should also realize that because these categories account for a relatively small component of the total workload, refinement here may be less important than for the active duty population and their dependents. That is, while the relative error may be larger, its magnitude would be less than those involved in forecasting other beneficiary group's demand.

2.1.1 Modifications and Refinements

The methodology employed by BUMED discussed above is basically sound. It analyzes the workload regardless of source for the population segments individually. It implicitly recognizes that projections for CHAMPUS workload, independent of how much care is provided to Navy hospitals and medical centers and in other Navy facilities, is senseless. That is, because these are substitute sources of care, neither can be projected independently of the other. However, refinements can and should be made to increase the accuracy of the estimates and to simplify evaluation procedures. The following modifications and refinements are covered in

this section: an adjustment for the intensity of care for the active duty personnel; new modifications to improve the estimates of the number of outpatient visits generated by the active duty Navy and Marine Corps personnel and their dependents; a more complete discussion of the number of retired beneficiaries; a discussion of the age factor in the retired population; the effect of some CHAMPUS definitions on their reporting of workload and the resulting impact on the previously discussed tables; a discussion of the impact of psychiatric and maternity care; and what may be gained through finer segmentation of the population into groups that have more similar utilization patterns.

Intensity of Care

Comparison of Table 2-1 with the other tables that describe the average daily patient load for segments of the beneficiary population other than the active duty personnel indicates that there is much higher utilization of inpatient services by the active duty population. That table, however, is uninformative as to the reason for these higher rates. Is it because there are more admissions to hospitals of active duty personnel, or is it due to a longer length of stay once these individuals are admitted? Or, in analytic terms, is the workload reported for the active duty population in terms of average daily patient load equivalent to that for civilian inpatients in terms of required resources? The earlier BCS Navy Medical Care Study reports, Findings and Implications and Costs and Economic Efficiency, presented the data and provided the analysis required to derive the appropriate conclusion.[1] The increased hospitalization

1 These conclusions are also supported by the works of others, among them Dr. David Whipple of the Monterey Post Graduate School and Capt. William Maxwell.

rate is due to both higher rates of admission and considerably longer lengths of stay. It was discovered during onsite visits that much of this extended care was for convalescence and required few resources. An adjustment is required because the average patient load for the active duty population is not defined consistently in terms of the resource requirements with the other beneficiary groups. This adjustment can be made in a similar manner to that employed in our earlier work. There, the methodology adopted assumed that an average length of stay in excess of ten days was primarily convalescent in nature (even this length is much longer than would be expected judging from similar experiences in the civilian sector). In this manner, the average daily patient load can be apportioned between convalescence and acute care. This will facilitate evaluating the quantities of medical services that are being consumed by the active duty personnel, and will allow more accurate resource requirement predictions since the workload then will be segmented by those outputs that require similar amounts of resources.

Outpatient Visits

The second problem is the inconsistency in the reported number of outpatient visits because other services also treat Navy and Marine Corps beneficiaries. This does not result in an underestimate of the workload that will be required of Navy facilities, but does prevent any straightforward comparison between the utilization rates of outpatient services by Navy and Marine Corps personnel and comparable groups with different incentives. The most accurate way to correct this problem is to acquire data from the Surgeon Generals of the Army and the Air Force showing how much care is

provided to Navy beneficiaries in their facilities. Or we can assume that similar amounts of care are provided among the services to each others' beneficiaries. Then an estimate of the amount of care provided to the Navy and Marine Corps personnel and their dependents is merely the amount of care that has been provided by the Navy to Army and Air Force active duty personnel and their dependents. This, in fact, is what has been done for the retired personnel and their dependents. This adjustment is probably not far wrong, and will certainly improve the estimates which have been generated to date. Again we emphasize that this adjustment is required for evaluation purposes only.

Age Factor

In some cases the retired and the dependents of retired and deceased personnel have an option to receive medical care from another source than those discussed up to this point. For those over 65 who qualify, medical services received in the civilian sector are generally paid for by Medicare, rather than by CHAMPUS. CHAMPUS pays virtually no claims to beneficiaries over 65 years of age. Oakland Naval Hospital, and Navy medical facilities in general, do provide care to this age group of retired personnel.[2] This, of course, introduces a complexity in that the entire retired population is not receiving benefits at the Navy's expense. Again, there are two alternatives to adjust for this discrepancy. One is to estimate the amount of care received by Navy and Marine Corps retired personnel under Medicare and include this

2 See Tables 5-7 and 5-8, pages 93 and 94, of Navy Medical Care Study - Costs and Economic Efficiency.

amount in the calculation of the hospitalization and outpatient patient visit rate. The second is to reduce the population by the number of retired personnel who do receive their care from Medicare. Neither of these alternatives is strictly feasible. The required data sources are difficult to obtain. However, data are available (Figure 2-9) showing the age distribution of the retired population. That table shows that currently 12 percent of the retired population is above 65 years of age. Furthermore, it indicates that the percentage of retirees above 65 will continue to increase in the future years. Hence, the importance of this factor will continue to be felt and the magnitude of its impact will increase in future years. This is especially significant, as it is the elder individual who uses a disproportionate amount of the medical services that are produced.

Retired Dependents/Retired Population Ratios

It was discussed earlier that the strength of the dependents of the retired and deceased personnel has been estimated as 1.8 times the strength of the retired personnel. Recently new evidence has suggested that for the Navy the more appropriate figure is 2.66. The comptroller division of BUMED has been directed to use this figure in future submittals of budget requirements to OSD. The impact, however, is unclear. The utilization rate has been calculated by merely dividing the total workload by the number of beneficiaries. With the higher ratio of dependents to retired personnel, the hospitalization and outpatient visit rates will fall. Of course, the strength of the population will increase by just enough such that the product of these two numbers (the hospitalization

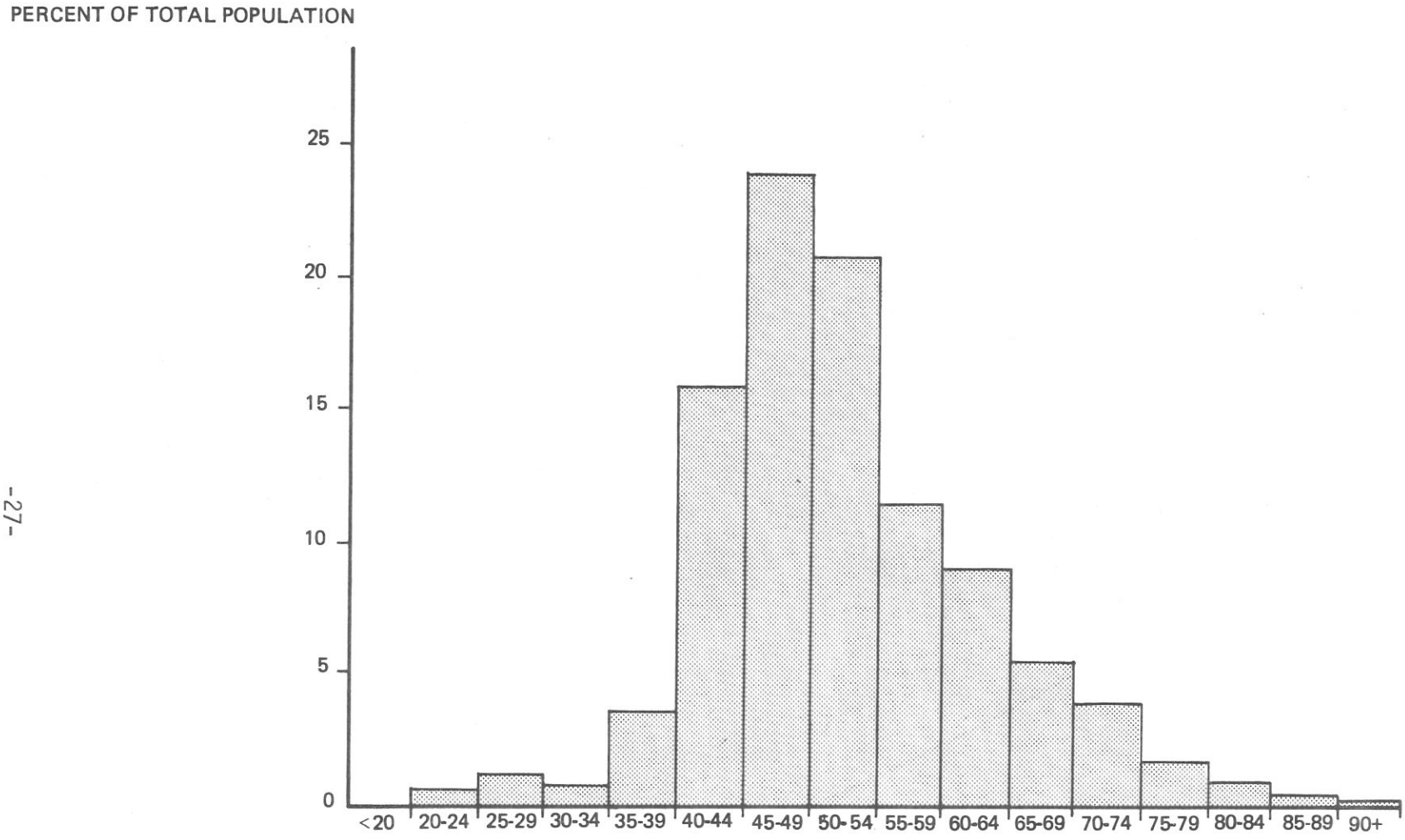


FIGURE 2-9 DISTRIBUTION OF RETIRED NAVY AND MARINE CORPS PERSONNEL BY AGE OF RETIREE — FY 1972

rate and the population, for example) will continue to be equal to the same number of patients, i.e., the historic workload generated by this population. Hence this change in the dependent ratio has little impact on projecting future workload. However, in an evaluation it plays a pivotal role. That is, in any evaluation comparisons will be drawn between the amount of medical services that are being consumed by this population and comparable populations elsewhere. The higher dependent ratio then implies a lower per capita consumption and should reflect favorably on the amount of resources that can be justified to support the dependents of the retired personnel.

CHAMPUS Reporting

An additional problem arises because CHAMPUS does not completely report the workload that is generated by civilian beneficiaries. This results primarily because of the $50 deductible for outpatient care. Unless an individual incurs medical costs in excess of $50, there is no reason to file a claim and thus be counted in the CHAMPUS workload. Additionally, CHAMPUS has defined all care that occurs 30 days prior to or 120 days after any inpatient stay as inpatient care. Apparently this was done so that the individual could avoid paying the deductible. (There are no deductible provisions for inpatient care.) In both cases, the result is substantial underreporting of the number of outpatient visits.

A simple adjustment that can be made to improve the estimate of the outpatient workload paid for by CHAMPUS is to attribute to each admission at least two outpatient visits, and to each delivery, ten outpatient visits. This correction is based on CHAMPUS data and is required not only for evaluation, but also because policy changes are contemplated that would count this outpatient care presently associated with inpatient stays as separate outpatient visits in the future.

More Narrowly Defined Subpopulations

Another consideration is that the population segments may themselves be too large. For example, consider the information contained in Tables 2-10 and 2-11. This shows the relative incidence of disease by International Classification of Diseases (ICDA) for the active duty population. However, here the active duty personnel are segmented into the following categories: Navy and Marine Corps, Officers and Enlisted Personnel and, among the enlisted personnel, recruits and nonrecruits. From these tables it is apparent that per capita consumption for the Marine Corps is higher than for the Navy, for the enlisted person is higher than for the officer, and for recruits is higher than for nonrecruits. Much of this is understandable and yet it is not clearly visible in the data contained in Table 2-1 or 2-5. Hence an evaluation would be limited. In the future, finer segmentation of the population and more detail on the diseases and injuries that are being treated (CHAMPUS provides its outpatient care not only by ICDA but also into the broader classifications - deliveries, medical, neuropsychiatric, and surgery) should be considered.

TABLE 2-10
RELATIVE INCIDENCE OF DISEASE
OFFICERS, ENLISTED PERSONNEL TOTAL

	Diagnostic class	Incidence rates per 1,000 average strength						
		Total all personnel	Officer			Enlisted		
			Total	USN	USMC	Total	USN	USMC
	All diseases and conditions	251.2	146.5	124.7	221.7	263.0	176.3	475.2
	Diseases	168.0	111.7	106.4	130.0	174.4	137.2	265.4
	Injuries	83.2	34.8	18.3	91.7	88.6	39.1	209.8
I.	Infective and Parasitic Diseases	16.3	7.1	6.3	9.9	17.4	10.9	33.0
II.	Neoplasms	5.3	5.3	5.4	5.0	5.3	5.1	5.7
III.	Allergic, Endocrine System, Metabolic, and Nutritional Diseases	4.2	5.2	5.2	5.1	4.0	3.8	4.7
IV.	Diseases of the Blood and Blood-forming Organs	0.8	0.6	0.6	0.7	0.8	0.5	1.4
V.	Mental, Psychoneurotic, and Personality Disorders	17.0	5.1	5.2	4.6	18.4	14.5	27.8
VI.	Diseases of the Nervous System and Sense Organs	11.1	7.8	6.8	11.2	11.4	6.8	22.8
VII.	Diseases of the Circulatory System	7.8	10.8	10.8	11.0	7.5	6.9	9.0
VIII.	Diseases of the Respiratory System	24.2	11.8	11.9	11.4	25.6	23.7	30.5
IX.	Diseases of the Digestive System	18.1	17.7	18.4	15.6	18.1	16.4	22.4
X.	Diseases of the Genitourinary System	9.9	7.9	8.0	7.5	10.2	9.3	12.3
XI.	Deliveries and Complications of Pregnancy, Childbirth, and the Puerperium	0.2	0.3	0.3	0.4	0.2	0.2	0.3
XII.	Diseases of the Skin and Cellular Tissue	13.3	4.1	3.3	6.5	14.3	10.7	23.0
XIII.	Diseases of the Bones and Organs of Movement	15.4	11.5	9.6	17.8	15.9	11.0	27.8
XIV.	Congenital Malformations	2.5	1.6	1.5	1.9	2.7	2.2	3.9
XVI.	Symptoms, Senility, and Ill-defined Conditions	16.3	9.9	8.8	14.0	17.0	11.4	30.7
XVII.	Accidents, Poisonings, and Violence	83.2	34.8	18.3	91.7	88.6	39.1	209.8
XVIII.	Supplementary classification for special admissions	5.6	5.0	4.3	7.4	5.6	3.8	10.1

Source: Inpatient Statistical Reporting System.

TABLE 2-10 (CONTINUED)

Diagnostic class	Incidence					Incidence rate per 1,000 Average Strength			
	Total enlisted	Recruit	Recruit incidence as percent of total enlisted incidence	Recruit		Total Enlisted	Recruit		
				USN	USMC		Total	USN	USMC
Average strength	944,245	43,030	4.6[1]	23,453	19,577	-	-	-	-
All diseases and conditions	248,328	27,488	11.1	15,399	12,089	263.0	638.8	656.6	617.5
Diseases	164,633	23,361	14.2	14,059	9,302	174.4	542.9	599.5	475.1
Injuries	83,695	4,127	4.9	1,340	2,787	88.6	95.9	57.1	142.4
Infective and Parasitic Diseases	16,390	1,931	11.8	1,450	481	17.4	44.9	61.8	24.6
Neoplasms	5,001	378	7.6	240	138	5.3	8.8	10.2	7.0
Allergic, Endocrine System, Metabolic, and Nutritional Diseases	3,818	478	12.5	354	124	4.0	11.1	15.1	6.3
Diseases of the Blood and Blood-forming Organs	738	82	11.1	32	50	0.8	1.9	1.4	2.6
Mental, Psychoneurotic, and Personality Disorders	17,318	1,737	10.0	444	1,293	18.3	40.4	18.9	66.0
Diseases of the Nervous System and Sense Organs	10,807	956	8.8	329	627	11.4	22.2	14.0	32.0
Diseases of the Circulatory System	7,091	718	10.1	362	356	7.5	16.7	15.4	18.2
Diseases of the Respiratory System	24,184	6,562	27.1	5,026	1,536	25.7	152.5	214.4	78.5
Diseases of the Digestive System	17,088	1,781	10.4	972	809	18.1	41.4	41.4	41.3
Diseases of the Genitourinary System	9,597	611	6.4	346	265	10.2	14.2	14.8	13.5
Deliveries and Complications of Pregnancy, Childbirth and the Puerperium	213	16	7.5	11	5	0.2	0.4	0.5	0.3
Diseases of the Skin and Cellular Tissue	13,508	3,848	28.5	2,404	1,444	14.3	89.4	102.6	73.8
Diseases of the Bones and Organs of Movement	14,972	1,951	13.0	843	1,108	15.9	45.3	35.9	56.6
Congenital Malformations	2,513	724	28.8	381	343	2.7	16.8	16.2	17.5
Symptons, Senility, and Ill-defined Conditions	16,061	1,410	8.8	713	697	17.0	32.8	30.4	35.6
Accidents, Poisonings, and Violence	83,695	4,127	4.9	1,340	2,787	88.6	95.9	57.1	142.4
Supplementary classification for special admissions	5,334	178	3.3	152	26	5.6	4.1	6.5	1.3

[1] Represents recruit strength as percent of total enlisted strength.
Source: Inpatient Statistical Reporting System.

Definition of Outputs

For evaluation purposes alternative plans should be compared to determine the impact and the rate of consumption of medical services, and the potential effect on the health status of the individual. However, in this comparison it is important to be careful as to what is included in the benefits that are paid for. For example, CHAMPUS funds a substantial amount of inpatient neuropsychiatric care (43 percent of the occupied bed days for Navy and Marine Corps beneficiaries in CY 1972 were classified into this category), much more than is generally available in civilian insurance plans. A comparison made according to occupied bed days per thousand population without defining the type of care being provided would lead to erroneous conclusions. A second example is maternity benefits. CHAMPUS does not count outpatient visits occuring during pregnancy; those outpatient visits for expectant women occuring in Navy hospitals are counted. There are different conventions in the civilian sector. This implies that type of care must be taken into consideration. Often the straightforward approach is incorrect.

2.1.2 Adjusted Data

In order to show the impact of some of the variables discussed above for FY 1973 we have adjusted the reported average daily patient load and the average daily outpatient visits for the four beneficiary groups. The results of these adjustments are recorded in Tables 2-12 and 2-13. The details of the calculations are shown in the footnotes for each table. Briefly we have separated psychiatric care from short-term medical care.

TABLE 2-12 - ESTIMATED
INPATIENT AVERAGE DAILY PATIENT LOAD (EXCLUDING PSYCHIATRIC)
(FY 1973)

Beneficiary	Acute Care	Convalescent Care	RATE Acute	RATE Convalescent
Active Duty [1]	2372	2372	3.06	3.06
Active Duty [2] Dependents	2191		2.43	
Retired [3] Personnel	1120		3.77	
Dependents of [4] Deceased and Retired Personnel	1470		1.86	

1. Assumes: 10% of care is psychiatric - based on Statistics of Navy Medicine Q2,FY1974,P6; half of remaining care is convalescent - based on Navy Medical Care Study Costs and Economic Efficiency.

2. Assumes: 42% of CHAMPUS work load is psychiatric - based on Annual Report M739D for CY1973, DCHAMPUS.

3. Assumes: 18% of CHAMPUS work load is psychiatric - based on Annual Report M739d for CY1973,OCHAMPUS; no adjustment for those over 65 years old.

4. Assumes: 44% of CHAMPUS work load is psychiatric - based on Annual Report M739D for CY1973 DCHAMPUS; 2.66 Dependents per Retiree.

TABLE 2-13 - ESTIMATED
OUTPATIENT AVERAGE DAILY VISITS
(FY 1973)

Beneficiary	Visits	Rate
Active Duty [1]1	18,141	23.37
Active Duty [2] Dependents	15,505	17.22
Retired [3] Personnel	2,651	8.94
Dependents of [4] Deceased & Retired Personnel	4,830	6.09

1. Assumes: Equal amounts of service provided to Navy and Marine Corps personnel by Army and Air Force as the Navy provides to their personnel.*

2. Assumes: Equal amounts of service provided to Navy and Marine Corps personnel by Army and Air Force as the Navy provides to their dependents.*

3. Assumes: Equal amounts of service provided to Navy and Marine Corps personnel by Army and Air Force as the Navy provides to their dependents;*10 unreported OPV per delivery and 2 per other admission for CHAMPUS work load - source of data Report 7038, OCHAMPUS.

4. Assumes: Equal amounts of service provided to Navy and Marine Corps personnel by Army and Air Force as the Navy provides to their dependents;*2.66 Dependents per Retiree.

* This assumption is supported by the Directorate of Information Operations, OASD, and the Comptroller's Office.

For the active duty population, this implies approximately a ten-percent reduction in the amount of reported services. For the civilians, the psychiatric care is concentrated in the CHAMPUS workload. (For details of this distribution of the incidence of disease treated at Oakland and through CHAMPUS, see Costs and Economic Efficiency, page 94.) This results because psychiatric services are not available to civilians within military hospitals except on a very short-term basis followed by transfer to civilian institutions. However CHAMPUS does report that 42 percent of the occupied bed days for dependents of active duty personnel, and 44 percent of the bed days reported for dependents of retired and deceased personnel, are for mental disorders. This disaggregation has been reported primarily for evaluation rather than prediction. However, it does imply that psychiatric care must be evaluated separately. Certainly these high rates of utilization of psychiatric services require further analysis.

For outpatient care the change with the most substantial impact was that of estimating the number of underreported outpatient visits occuring for the CHAMPUS users. This was done by assuming that there were ten unreported outpatient visits per delivery and two per other admissions in FY 1973. The calculation has been based on data supplied by OCHAMPUS in Denver. Again here we must mention that this adjustment is not required for predictive purposes so long as CHAMPUS maintains its current reporting procedures, which do not detail the number of outpatient visits occuring when related to an inpatient visit. However, for evaluation purposes and to guarantee comparability to other sources this estimate is necessary. The impact can be seen in Table 2-13.

2.1.3 Comparison to Civilian Sources: Evaluation

In order to facilitate the comparison to civilian data a simple adjustment of Tables 2-12 and 2-13 is required. It is that, rather than reporting daily rates, rates per year must be derived. This implies mere multiplication by the number of days in each year. The calculation has been completed and summarized in Table 2-14. We should note that the occupied bed days per thousand reported for the active duty population is only that for the acute care shown in Table 2-12. If all occupied bed days for the active duty personnel were to be counted as acute care, the rate reported in the following table would have been twice that which is actually shown there. We have also included here as Tables 2-15 and 2-16 showing various utilization rates that have been reported in the civilian community. For inpatient care Table 2-15 reports that the health maintenance organizations have lower inpatient utilization rates than does the U.S. population or Aetna Insurance Company's beneficiaries. The U.S. population as a whole reported the highest rate. This may be in part the result of the fact that the other data is primarily derived from the working population which probably has fewer medical problems than the U.S. population as a whole. Table 2-16 reports outpatient utilization rates. Here, too, there is a variance again due to age and sex, but also in part due to price effects which are not specifically identified on that table. A more detailed discussion of these data sources for both inpatient and outpatient care is included in our earlier report, Navy Medical Care Study, Appendix E.

TABLE 2-14

ANNUAL UTILIZATION RATES OF ACUTE INPATIENT AND OUTPATIENT SERVICES

Beneficiary	OBD/1000	OPV
Active Duty	1117*	8.53
Dependents of Active Duty	887	6.29
Retired Personnel	1376	3.27
Dependents of Retired and Deceased Personnel	679	2.22

* Based on the assumption that half of the reported OBD's are in fact convalescent. If all OBD's were counted as acute, then this rate would be doubled.

Source: Tables 2-12, 2-13

TABLE 2-15

VARIOUS RATES OF INPATIENT UTILIZATION
(OBD/1000)

Kaiser-Permanente,[1] Northern California	615
Kaiser-Permanente,[1] Males 20-44 Years Old	225
Group Health[2]	398
U.S. Population[3]	1205
Aetna Insurance[4] Males	870

1 Source: Somers, Anne (Editor). The Kaiser Permanente Medical Care Program, The Commonwealth Fund, 1971.

2 Source: Discussions with Group Health.

3 Source: Derived from data in Socio-Economic Issues of Health, 1972 edition, AMA.

4 Source: Correspondence with Aetna.

TABLE 2-16

VARIOUS RATES OF OUTPATIENT UTILIZATION
(OPV/PERSON)

Data Source	Population	OPV Rate
IZ	U.S. Male 17-45 1968	4.2
IZ	U.S. Male 17-45 1969	3.1
IIIZ	Kaiser Plan Under 65	3.3
IVZ	U.S. Population 1966	5.7
IVZ	U.S. Population 1968	4.3
VZ	Male 25-45 1966	4.1
VZ	Male 25-45 1968	3.3

IZ Socio-Economic Issues of Health, American Medical Association, 1972.

IIIZ Hurtado, Arnold, et al., Home Care and Extended Care in a Comprehensive Prepayment Plan, Hospital Research and Educational Trust, 1972.

IVZ, VZ Scitovsky, Anne A. and Snyder, Nelda M. "Effect of Co-Insurance on the Use of Physician Services," Social Security Bulletin, June 1972.

Of course, an evaluation must be made of how much care is cost effective. Certainly both the incentives and the administrative procedures adopted by the Navy currently have resulted in higher rates of utilization than comparable data sources indicate are typical of the civilian population. At present we do not feel confident to make that evaluation. Too little is known of exactly why these high rates of utilization are occuring in Navy hospitals or, in fact, what services are being performed. Similarly the whole question of the impact of medical services on health status has not been satisfactorily addressed anywhere. Yet the decision as to the cost effective level of medical services depends critically on these two sets of information.

2.1.4 Price and Time Effects

Of course, the above discussion is not complete. It has omitted many variables that affect incentives of both providers and consumers of medical services and, as such, affect the amount that must be produced to satisfy effective demand. Some of the left-out variables that may have an impact can be determined by examining factors for which the insurance companies adjust their premiums. They do so because in order to cover total costs they must analyze what the effective demand will be. Included among these variables are the following: the plans' benefits, such as whether maternity care and mental and nervous disorders are covered expenses; level of the deductible; the co-insurance rate; the geographic area in which the beneficiary will receive care; the age, and sex composition of the population covered; and whether there are limits on deductibles or the maximum coverage. Of course, an additional

variable is the waiting time or the distance one must travel to see a physician. Generally these adjustments are made using ratio analysis and the known experience of standard plans. For example, if the deductible is at variance from the standard, a simple multiplicative factor would be used to project the experience and cost of the proposed indemnity insurance plan. Here we will discuss only the impact of altering the price which the individual must pay (i.e., by changing the deductible or the co-insurance rate) and the effect of time on the demand for medical care. Some of this discussion has been taken from our earlier work, the Navy Medical Care Study - Costs and Economic Efficiency.

This discussion is relevant because, while only minimal charges are made for inpatient care in Navy medical facilities, significant co-insurance rates and deductibles are required for CHAMPUS. For inpatient care, active duty dependents must pay the greater of $1.75 per day or $25. Other beneficiaries pay 25 percent of the cost. Outpatient care is subject to a $50 deductible and a co-insurance of 20 percent for active duty dependents, 25 percent for others. Hence if CHAMPUS was substituted as the source of care, these positive prices can be expected to reduce the level of demand.

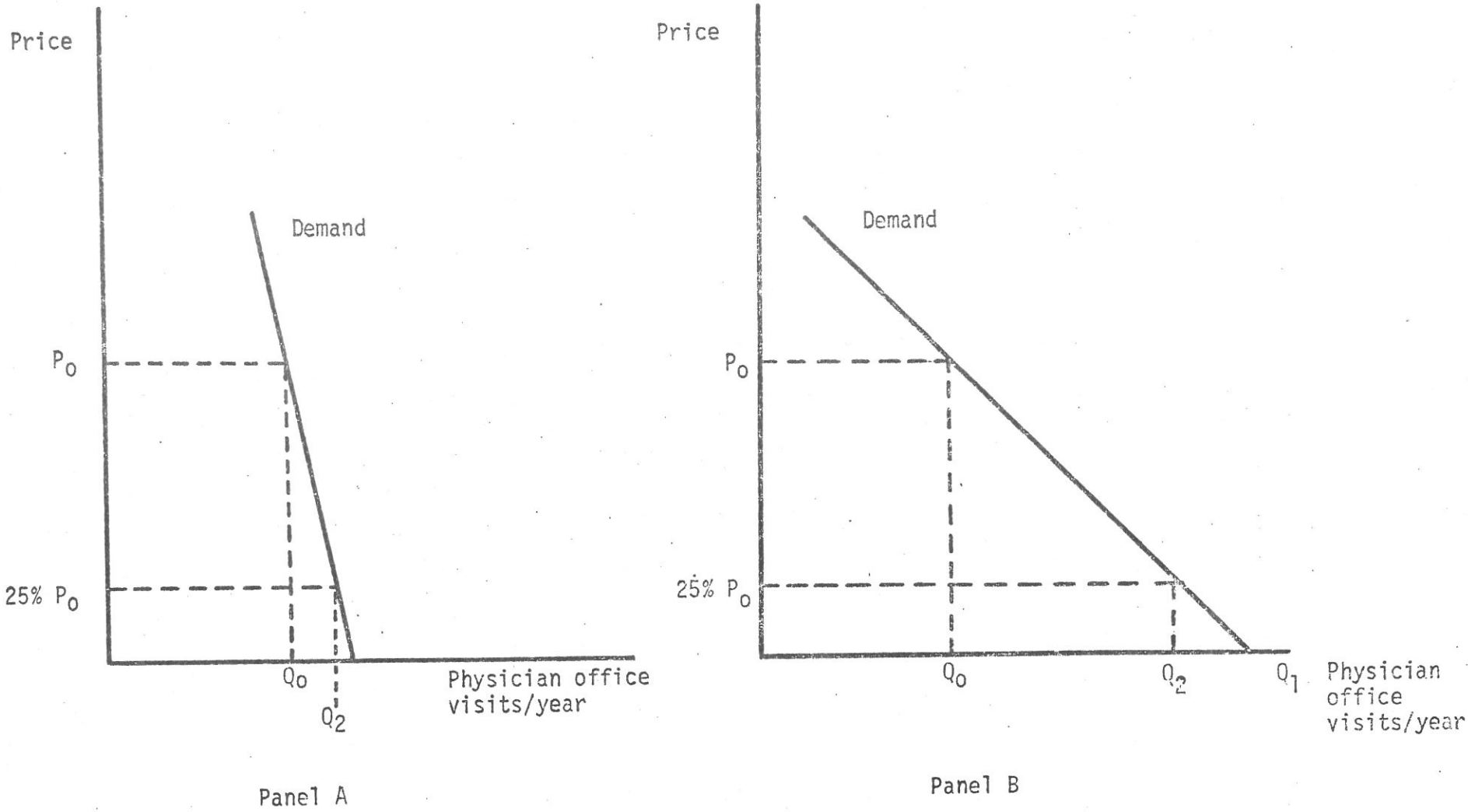
Some may object to this approach as they believe health care should be provided as a right to all. It would be convenient if we could do so and in unlimited quantities. Because this is impossible with currently available resources, medical care must be rationed. One of the functions

of price is to perform this rationing. Other methods are available but are generally less efficient and more costly. The difficulties encountered by the Nixon administration in attempting to establish economic controls should be warning enough as to the problems inherent in such a policy. Currently, the Navy medical system allows the queue, or the waiting line, to ration these resources. People demanding care often wait for up to three hours to see a physician or spend an entire day waiting in various lines and sometimes are still not satisfied.

Another criticism of the use of price for rationing is that it implies discrimination against those with less income. This occurs every day in the purchase of cars, houses, food, clothing -- virtually every market transaction. However, somehow medical care is different; it is often regarded as a "right" rather than a "good." This objective may be overcome in some part through a differential pricing based on family earnings.

The significance of the above discussion is determined by the magnitude of the response of persons demanding medical care to different prices of that care -- the elasticity of demand. For the case of office visits, this has been simply illustrated in Figure 2-17. In both panels A and B, the price of a physician office visit is shown on the vertical axis. The horizontal axis measures the number of physician visits per person per year. The demand curve shows the functional relationship between the number of visits per year as the price varies. Panel A shows the hypothetical case when the demand is highly inelastic, i.e., the consumers

FIGURE 2-17 - ELASTICITY OF DEMAND -
PHYSICIAN OFFICE VISITS



are little influenced by the monetary charge. They require virtually the same number of visits independent of the price. If we assume that the initial price is P_0 then they would demand Q_0 visits per year. From the diagram we can see that if a 25-percent co-insurance is charged (price = 25-percent P_0), individuals will demand Q_2 visits per year. At a zero charge, they will demand Q_1 visits.

Panel B shows the case of a relatively elastic demand for medical care. If we again assume that the initial price charges is P_0, then the number of visits demanded per year would be Q_0, as it was in Panel A. However, with a zero charge the number of visits can be determined by the intersection of the demand curve with the horizontal axis. The number of visits demanded would be Q_1. Clearly in this case the impact of the insurance would be to significantly increase the number of office visits demanded per year. This impact may be reduced by instituting a 25-percent co-insurance as has been shown at 25-percent P_0. Then the quantity demanded would be Q_2, a much more moderate amount.

It should be kept in mind that the consumers are worse off after the institution of the 25-percent co-insurance than with the zero price. They will now consume less medical care, i.e., they will go to see a physician less frequently and they now have to devote some portion of their income to paying their medical expenses. As a result they will now have less to spend on the other necessities and pleasures of life. These two losses, then, must be balanced against the decrease in cost. If it were a private insurance program, one would expect to have lower premiums for the beneficiary population, and correspondingly reduced costs.

However, it must be emphasized that a part of this reduction is at the beneficiary population's expense. Economic theory does suggest that the consumer could be compensated such that he would voluntarily agree to such a program at a lower overall cost.

The above discussion clearly indicates that the important variable is the slope or the elasticity of the demand curve. If it is highly inelastic, then changes in demand associated with changes in price can be ignored. However, if there are indications that the demand is elastic, one would have to expect that this fringe benefit will also increase the demand for medical care.

Empirical estimates of the magnitude of the elasticity of demand are discussed more completely in Appendix C of Navy Medical Care Study. Those findings will be briefly summarized here. All of the studies of the demand for outpatient care found that price did have a significant impact on the rate of utilization of outpatient services. More specifically: Scitovsky and Snyder reviewed the data from a Palo Alto clinic. They found that a 25-percent co-insurance would result in a 24-percent decline in physician visits and a 23-percent decline in cost. Phelps and Newhouse reviewing this same data found that for their "average" family the 25-percent co-insurance would result in a 32-percent reduction in visits and a 28-percent decline in cost. They also found that groups expected to have a lower time opportunity cost would be affected to a greater extent than others. Jan Paul Acton completed a study of low-income groups in New York City. Its focus was on the effects of waiting and traveling time. He found that

for public care a 25-percent increase in traveling time would imply a 75-percent reduction in the number of outpatient visits. For private care this increase in traveling time would result in a 66-percent decline in the number of visits. These large magnitudes are in some part a reflection of the substitution of alternative sources of care rather than an absolute decline in the amount of care demanded. Acton's results also imply that a 25-percent increase in waiting time would decrease the number of visits to physicians in private practice by 22 percent and to those in public clinics by 10 percent. The Phelps and Newhouse study of insurance premiums found that a 25-percent co-insurance would decrease physician expenditures by 30 percent. Their review of the Saskatchewan study showed that a 40-percent co-insurance would reduce physician office visits by 17 percent and home visits by 60 percent. There is undoubtedly a substitution effect between home visits and office visits as their relative prices changed in this last experiment.

Somewhat more recent analysis of the issue of the effect of time and price is included in the New England Journal of Medicine, Volume 290, 1974. In an article entitled "Policy Options and the Impact of National Health Insurance," Joseph Newhouse and Charles Phelps, economists from the Rand Corporation, and William Schwartz, a medical doctor, conclude that a 10 percent co-insurance rate on inpatient care would reduce demand from 5 to 15 percent below that which would occur if there was no co-insurance whatsoever. For outpatient care, they estimate that 25 percent co-insurance would reduce demand by 25 percent below that which would exist under full coverage. Furthermore, they conclude that both travel time and waiting time do exert significant influence on the

amount of medical services demanded. Of course, this is especially important for care provided in Navy facilities as currently there are virtually no price effects to be considered except the impact of distance, travel time, and waiting time.

A second article by R. G. Bech in the Journal of Human Resources, "The Effects of Co-Payment of the Poor," concluded that in 1968 a $1.50 co-payment for outpatient care resulted in an 18-percent fall in the amount of services demanded by low-income groups.

These studies indicate that the range in reduction of use of outpatient services is only vaguely defined. Additionally, their findings are not directly applicable to the Navy population. None of them considered the impact of a deductible, which we anticipate would increase the relative reduction in the use of outpatient facilities. Additionally, the demographic characteristics as well as the opportunity time cost of the use of outpatient facilities probably varies to the extreme across these studies, especially when compared to the Navy beneficiary population. However, the above findings do indicate a range of the magnitude of the reduction of utilization of outpatient services when civilian beneficiaries are faced with the co-insurance and deductible provisions of CHAMPUS.

2.1.5 Summary

We have presented data that shows the historic relationship between population and effective demand for medical services. The hospitalization rates and the patient visit rates were calculated to provide the ratios for projecting future workloads. However, these rates are only a description

of the past and hence are dependent on the incentives embodied in the pattern of delivery during the years 1969 to 1973. There are other effects; among them, time, price and age and sex of the population also must be considered if it is thought that these variables have changed significantly.

We have discussed the evaluation process that must be a part of the decision on how large a pool of resources to allocate to medical services. We suggested that comparisons should be made between the rates of consumption of medical services made with civilian population groups. If discrepancies are found, then finer detail is required to determine why one group is consuming more medical services than the other. Additionally, the evaluation must face the difficult question of whether these additional medical services do in fact affect the health and morale of the population and whether or not the costs are worth the benefits.

2.2 DENTAL SERVICES

The problem of projecting the required level of dental services can be approached in a manner similar to that adopted for inpatient and outpatient services. Tables 2-18 through 2-20 report for the period FY 1969 - FY 1973 the number of dental sittings by their source (Navy hospitals and medical centers, Navy dental clinics, ships, and other activities). They also show utilization rates for three beneficiary categories: active duty personnel, dependents of both the active duty and retired personnel, and a category labeled "other" which is primarily composed of retired personnel. As can be seen the number of dental

TABLE 2-18 - DENTAL SITTINGS -

ACTIVE DUTY PERSONNEL, ALL SERVICES

PERIOD	NAVY HOSP. & MED. CTR.	NAVY DENTAL CLINIC	SHIPS	ALL OTHER ACTIVITIES	WORLD WIDE TOTAL	POPULATION ADU NAVY & MC	SITTINGS PER 1000
Total FY 69	252,414	594,994	647,129	3,221,542	4,716,079	1,070,858	4,404
Total FY 70	288,929	597,953	565,076	2,918,076	4,370,034	1,027,223	4,254
Total FY 71	226,957	483,585	448,299	2,656,309	3,815,150	889,753	4,288
Total FY 72	172,423	365,791	417,484	2,545,485	3,501,183	805,990	4,344
Total FY 73	170,682	345,736	412,642	2,425,309	3,354,369	776,322	4,321

Source: Statistics of Navy Medicine, Quarterly Issues

TABLE 2-19 - DENTAL SITTINGS -

DEPENDENTS (BOTH ADU AND RETIRED, ALL SERVICES)

PERIOD	NAVY HOSP. & MED. CTR.	NAVY DENTAL CLINIC	SHIPS	ALL OTHER ACTIVITIES	WORLD WIDE TOTAL	POPULATION ADU NAVY & MC	SITTINGS PER 1000
Total FY 69	18,905	53,807	3,368	238,846	314,926	1,413,077	223
Total FY 70	21,503	54,939	3,939	245,229	325,610	1,400,968	232
Total FY 71	25,562	65,057	6,810	265,372	362,801	1,386,361	262
Total FY 72	29,892	53,115	1,415	251,557	335,979	1,413,631	238
Total FY 73	30,320	52,262	3,062	231,262	316,906	1,434,169	221

Source: Statistics of Navy Medicine, Quarterly Issues

TABLE 2-20 - DENTAL SITTINGS - OTHER

PERIOD	NAVY HOSP. & MED. CTR.	NAVY DENTAL CLINIC	SHIPS	ALL OTHER ACTIVITIES	WORLD WIDE TOTAL	POPULATION (RETIRED)	SITTINGS PER 1000
Total FY 69	40,605	51,678	11,736	206,193	310,212	241,078	1,287
Total FY 70	46,109	51,010	8,135	211,733	316,987	254,864	1,244
Total FY 71	44,080	55,905	1,559	225,974	327,518	267,488	1,224
Total FY 72	46,549	66,261	1,815	226,742	341,367	282,617	1,208
Total FY 73	39,984	77,927	1	245,502	363,414	296,440	1,226

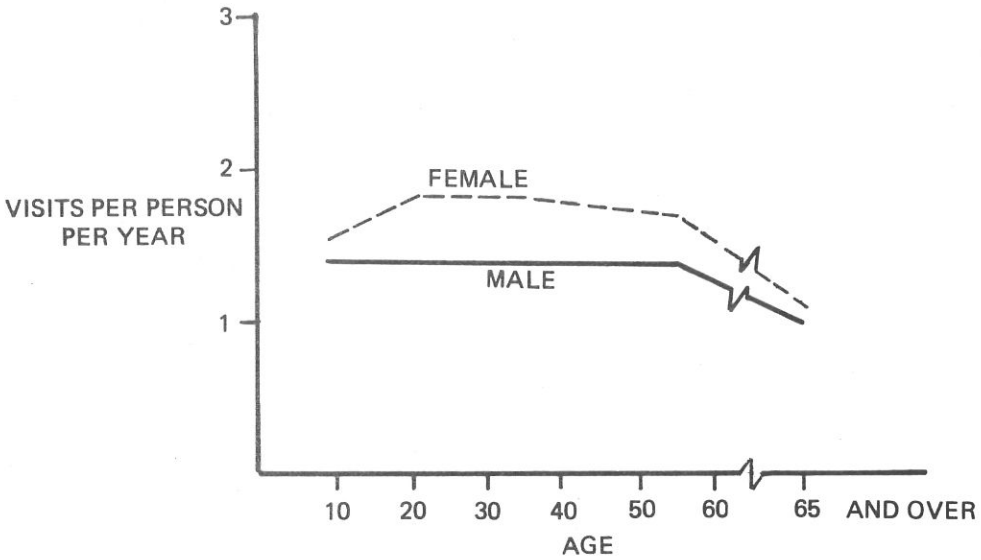
SOURCE: STATISTICS OF NAVY MEDICINE, QUARTERLY ISSUES

sittings per thousand population within each of these groups, while varying widely among categories, is stable for each subpopulation. They are apparently satisfactory predictors of the number of dental sittings that occur in Navy facilities.

Some problems with the data require discussion. First, as indicated on Table 2-18, included in the number of sittings are those for all active duty personnel regardless of service. However, in order to calculate the sittings per thousand we have divided by the Navy and Marine Corps population. Again the assumption is that the other services provide comparable amounts of care to Navy beneficiaries as the Navy does to the Army and Air Force personnel. Even if this assumption is incorrect, it would only result in minor changes in the utilization rates calculated. Only approximately one percent of the workload reported on Table 2-18 is the result of the demand from the other services. Similarly for Tables 2-19 and 2-20 the number of sittings includes all those for both Navy beneficiaries and other services.

As with medical services there are many variables that influence the number of dental sittings; among them age, income, and price in the civilian sector and, specifically for the armed forces, administrative procedures. As part of the evaluation process for programming and planning one must face the decision as to how many dental visits should occur. To facilitate that decision we present here data from the civilian sector showing for 1969 the average number of dental visits per person per year by age and sex (see Table 2-21). As can be seen there, the male population annually consumes somewhat less than 1.5 visits per

TABLE 2-21 DENTAL VISITS PER PERSON PER YEAR, BY AGE AND SEX (USA, 1969)*



SOURCE: U.S. NATIONAL CENTER FOR HEALTH STATISTICS, CURRENT ESTIMATES FROM THE HEALTH INTERVIEW SURVEY, U.S.A., 1969, PUBLIC HEALTH SERVICE PUB. NO. 1000, SERIES 10, NO. 63 (ROCKVILLE, MARYLAND, JUNE 1971), TABLES 18, 20, pp. 21, 23.

*CIVILIAN, NON-INSTITUTIONALIZED POPULATION

person. By comparison the rate of utilization for the active duty population in FY 1973 in terms of dental sittings was 4.3 per year. This is approximately 2.9 times the civilian rate. Whether it is cost effective is subject to discussion. The rates of utilization of the other beneficiary categories are significantly below that reported in Table 2-21, in large part due to the limited right to dental care of these beneficiaries in Navy facilities. However, the recent change of policy which will result in greater benefits to those dependents overseas will likely increase utilization rates.

The essential factor in this evaluation is the determination by policy makers of the cost effective rate of utilization. Currently, by default, the effective decision apparently has been approximately 4.3 sittings per active duty individual. We are not competent to make that value judgement as we are unaware of studies in the civilian sector measuring the impact of marginal dental visits on health status. Of course, the rate of visits is far different for active duty personnel than for the civilian sector in general. This in itself requires some justification.

2.3 OTHER OUTPUTS

Other final outputs of the Navy health care delivery system can be broadly classified into the two categories of public health and research. However, we have not developed any analysis that describes how much of either should be produced. In large part this is due to the difficulty of quantifying the output of these categories and the investment aspects of each.

More specifically, public health is often preventative in nature and it is difficult to estimate what has been prevented, and how much of it. Additionally, this is a catch-all category, so in fact, there is a vector of outputs. Yet because of the EOB account structure and its data processing, often it is impossible to more specifically allocate the expenses to the various outputs. Hence even if output levels were more subject to analysis, cost functions could not be developed.

Research outputs are both difficult to evaluate and uncertain. In fact these expenses must be regarded as investments that may yield future benefits in terms of longer life, decreased pain, or perhaps less expensive but equally effective treatment. That is, the true output of research will accrue over an indefinite number of future years. But the benefits are uncertain. Only the expenses are both quantifiable and visible today.

While we do not provide any measures of the outputs of public health or research, we will report their expenses in Chapter 3.0 and in somewhat more detail in the appendices. This implies that case-by-case consideration is required for cost justification. We can note that these two categories amount to less than four percent of the expenditures, and thus require less emphasis.

2.4 INTERMEDIATE PRODUCTS - TRAINING REQUIREMENTS

Training requirements for all Navy specialties are determined, in a step down process, by the manpower requirements that follow from the Five Year Defense Plan (FYDP). Detailed manpower plans are developed by OPNAV (Deputy Chief of Naval Operations - Manpower) and subsequently

training plans are developed as a result of analysis of manpower dynamics such as retirement, promotion, attrition, etc. and the manpower requirement. BUPERS controls the information concerning the dynamics. Training billets are basically controlled and, except for BUMED training, administered by the Director of Naval Education and Training (DNET) NOP-099.

Output of the training programs is a function of the number of billets assigned to the program and the length of the course (as well as attrition, etc.). In the operational sense the programming task becomes one of shifting billets from one program to another (mainly student billets although sometimes staff billets also), and adjusting the length of the course such that the required output can be produced in the given fiscal year.

Within the specialized training area, BUPERS develops training requirements for all "A" schools through its Status-Time-Attrition Planning Methodology (STAPLAN). This is a linear flow planning program that utilizes both manual and computer operations to project enlisted personnel inventories for a period of seven years, compare inventories to billet requirements, and determine future annual rating inputs needed to meet requirements. (See PERS-A1231/par for a detailed description of the STAPLAN model.)

The output of the STAPLAN model is further analyzed by BUMED (Code 34) but essentially becomes the training requirements plan for the hospital corps schools at Great Lakes and San Diego. In the case of "C" schools,

BUMED develops the detailed training plans by a manual process similar to the more automatic STAPLAN. Professional training is also detailed manually by the responsible claimant (i.e., Nurse Corps, Medical Service Corps, Dental Corps, and Medical Corps).

2.4.1 The Driving Factor

In order to test how the CNO-imposed requirements drive the training loads, we asked BUPERS to use the STAPLAN model to calculate the number of students should the requirements be altered. More specifically, we requested that STAPLAN be run with both a 10-percent increase and a 10-percent decrease in authorized end strength. The following discussion summarizes the results of this analysis.

The STAPLAN output is the "Peg Number," the unadjusted input requirement for the Class "A" school. This number is adjusted for school attrition to yield the input requirements. The attrition factor used is 15 percent. The STAPLAN requirement for FY 1975 was 4148, but this was thought to be too low by BUMED analysis and therefore the actual plan ended up at 4500 after the BUMED-BUPERS negotiation process. Results of the STAPLAN runs are summarized in Table 2-22. Table 2-23 shows the results in terms of percentage change in Class "A" school input requirements as a result of 10-percent increase and decrease in authorized end strength. This table shows that a 10-percent decrease in manpower requirements would stimulate about a 60-percent decrease in Class "A" school input requirements in the first year, and a 10-percent increase in manpower requirements would stimulate a 70-percent increase in input requirements.

TABLE 2-22

RESULTS OF STAPLAN

SENSITIVITY RUNS

ADJUSTED INPUT REQUIREMENTS

FOR HM CLASS "A" SCHOOLS

	EAOS FY75	EAOS FY76	EAOS FY77	EAOS FY78	EAOS FY79
ORIGINAL CNO RQMT.	4148	3794	4318	5593	4319
3 YR FIT -- 10% DECREASE	1703	3115	4079	5340	4079
3 YR FIT -- 10% INCREASE	7081	4029	4557	5845	6091

TABLE 2-23

PERCENTAGE CHANGE IN

CLASS "A" SCHOOL INPUT

REQUIREMENTS RESULTING FROM

10% CHANGES IN AUTHORIZED END STRENGTH

	FY75	FY76	FY77	FY78	FY79
3 YR FIT -- 10% DECREASE	-58.9%	-17.9%	-5.5%	-4.5%	-5.6%
3 YR FIT -- 10% INCREASE	+70.7%	+ 6.2%	+5.5%	+4.5%	+41.0%

TABLE 2-24

EFFECT OF REQUIREMENT CHANGES

ON CLASS "C" SCHOOL INPUT

FOR 28 HM NEC's

	BASELINE	LESS 10%	PLUS 10%
TOTAL FY75 REQUIREMENT	7083	6375	7791
FY74 ADJ. INPUT REQUIREMENT	1501	979	2314
EXCESS CARRY OVER	202	331	78

These figures do illuminate the dynamics of the enlistment cycle. The enlistments of the large number brought into school in the first year would expire in the fifth year, thus creating a requirement for another large batch of school inputs. Clearly, unless reenlistment rates can be substantially improved, level loading of Class "A" schools is virtually impossible.

2.4.2 The Manual Model

Planning for BUMED's Class "C" schools is done manually by BUMED-34, but the method is essentially the same as was done for the STAPLAN analysis. We have similarly investigated the impact of requirements for each NEC (increased and decreased by 10 percent) and then the school input requirement is calculated. Table 2-24 summarizes the results of a 10-percent increase and decrease in end strength on the school inputs. The table indicates that a 10-percent decrease in total requirement would result in a 34.8-percent decrease in required input with an additional excess of 66 percent (of the new requirement) in student carryover. If the requirements were increased 10 percent this would generate a 54-percent increase in student input and, moreover, the excess carryover would be only 3 percent of the (new) requirement as compared with 13.5 percent in the baseline requirement.

Thus the effect on Class "C" input requirements of 10 percent force changes as calculated by a manual method is similar to that on Class "A" input requirements as calculated by the computerized STAPLAN mode. Figure 2-25 graphically illustrates the response pattern for the Class "A" schools, i.e., the STAPLAN calculation.

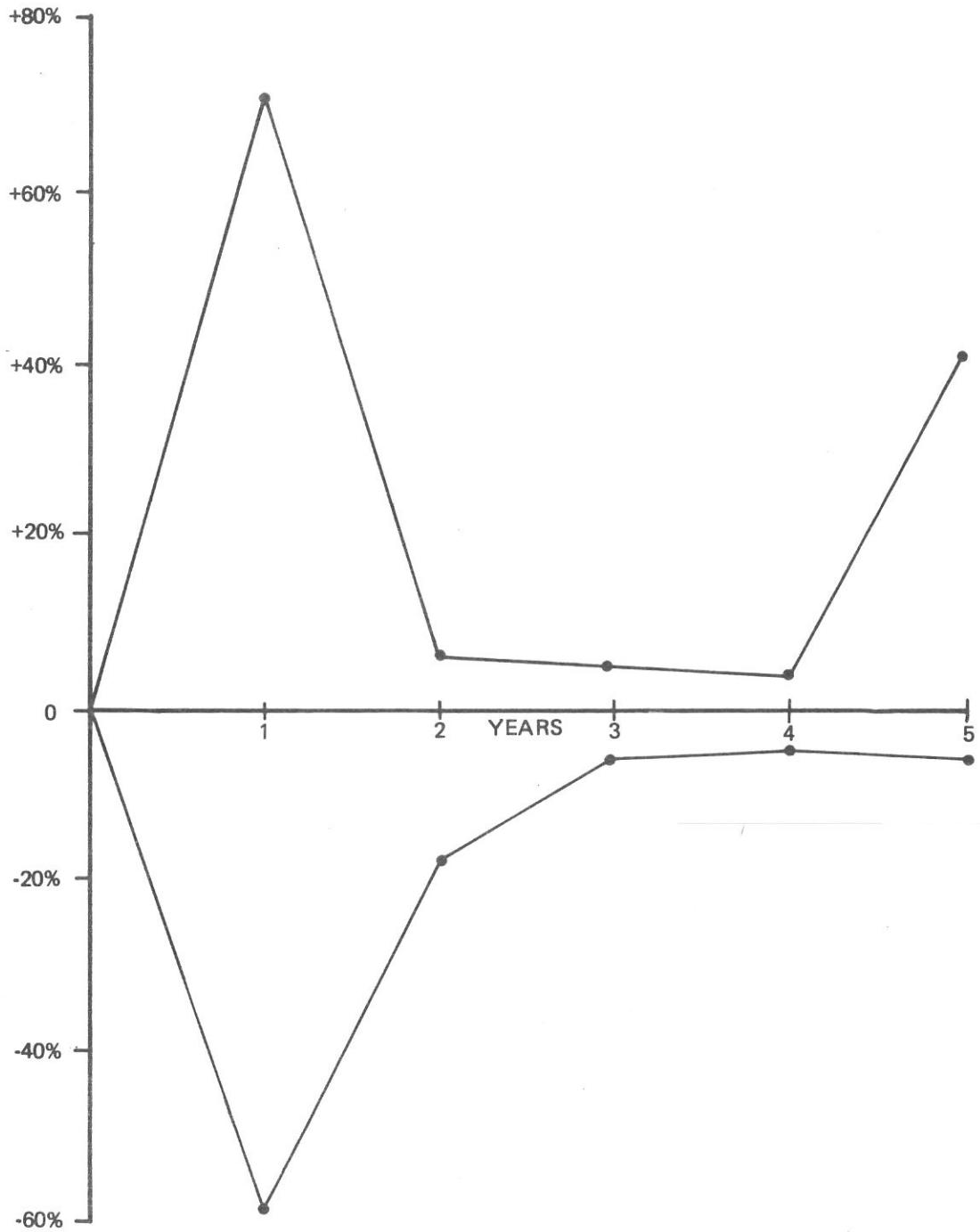


FIGURE 2-25 RESPONSE PATTERNS OF CLASS "A" SCHOOL ENROLLMENT TO 10% INCREASE AND DECREASE IN AUTHORIZED CORPSMAN END STRENGTH

3.0 TOTAL EXPENDITURES AND COST ANALYSIS

In Chapter 2.0 we analyzed those factors that affect the level of output for inpatient and outpatient medical services, dental services, and training. Additionally we briefly discussed the funding of both public health and research. In this chapter we present the data that reports total expenditures in each of these categories. We also identify the expenditures for administration of the entire Navy health care delivery system. (These primarily occur at the Bureau of Medicine and Surgery and include expenses for the command, automated data processing, and telecommunications.) Finally we present a marginal cost analysis for those services for which we have described output indicators.

3.1 TOTAL EXPENDITURES

In all of our calculations of total expenditures we have allocated the costs of capital funded from OMN appropriations, the expenses for maintenance and operation of personnel quarters, and the expenses incurred for the All-Volunteer Force against the outputs of each Navy activity. The reasons for doing so are discussed in Appendix E along with the tables showing the actual adjustment figures. Adjustments are made in each case by distributing these expenses in proportion to the total expenditures of each output.

3.1.1 Inpatient and Outpatient Services at Navy Hospitals and Medical Centers

The Expense Operating Budget (EOB) distributes the expenditures made by each field activity across various outputs. Two of these, specifically identified as cost centers 48* and 50, are inpatient and outpatient

* We have used cost center 48 to accumulate all of the expenses for inpatient care. In fact the EOB provides more detail in cost centers 01-48. Our cost center 48 is the sum of those (01-48).

services. For each of the 43 activities reporting in the EOB, we have summarized the third quarter report that shows the year-to-date expenses. However, as discussed in Appendix D, this allocation is not satisfactory for a number of reasons. First, the EOB includes expenditures for telecommunications, which are programmed separately. But, because these expenditures do not come from those program elements for hospitals and medical centers (81211 and 81212), it is necessary to treat these sums separately. Therefore, we have deducted the cost of telecommunications (cost center 7) from the inpatient and outpatient expenses. Secondly, the EOB figures do not include an adjustment for capital from OMN appropriations, expenses for operations of quarters, and costs of AVF, as mentioned above. These adjustments are shown in complete detail by UIC in Appendix E and summarized here in Table 3-2 and 3-3. (Table 3-1 may be required to interpret Table 3-3. It identifies the reporting activities by UIC and name.)

Table 3-2 reports the number of occupied bed days by beneficiary group for each UIC, the total expenditures for inpatient services, and the unit cost. The unit cost for all activities, after the adjustments mentioned above, was approximately $84.00. However, there are some errors in the data that the reader should be cautioned against. Chelsea Naval Hospital (UIC00112) at Boston did not report any expense because it was int the process of being closed. There is some indication that the National Naval Medical Center at Bethesda (UIC00168) reported expenditure data for only two quarters rather than three quarters. Consequently, its unit cost is understated. St. Albans Naval Hospital (UIC60008) reports extremely high unit costs; but it, too, is in the transition from being a Navy hospital to being operated by the Veterans Administration. If these three UIC's are deleted from the sample, the

TABLE 3-1

PROGRAM ELEMENT REPORTING ACTIVITIES

UIC	PE	FY	CHG	EOB	AAA	BCC					
BUMED	81211N	74	00018	00018	00018	MC	LC				
H PTMTH NH	81211N	74	00105	00105	00105	MC	LC	F	U		
H BOSTON	81211N	74	00112	00112	68086	MC	LC	F	U		
H ANAPOLIS	81211N	74	00162	00162	00162	MC	LC	F	U		
NNMC BTHSD	81212N	74	00168	00168	00163	MC	LC	F	U	MB	ME
NAMC PNSCL	81212N	74	00203	00203	00203	MC	LC	F	U	MB	
H QUANTICO	81211N	74	00231	00231	00231	MC	LC	F	U		
H KEY WEST	81211N	74	00267	00267	00267	MC	LC	F	U		
H C CHRIST	81211N	74	00285	00285	00285	MC	LC	F	U		
NDC YKSUKA	81216N	74	0453A	62499	68292	ME	LC	F			
H PNSACOLA	81211N	74	0499A	00203	00203	MC	LC				
NPMU6 PHBR	81216N	74	0545A	0545A	00604	ME	LC	F			
NPMU5 SDGO	81216N	74	0546A	0546A	68056	ME	LC	F			
NDS BTHSDA	81113N	74	0608A	00168	00168	MB		F			
NMS BTHSDA	81113N	74	0619A	00168	00168	MB		F			
HCS G LKS	81112N	74	0620A	68092	68092	MA		F			
HCS SDIEGO	81112N	74	0621A	68056	68056	MA		F			
NSHA BTHSD	81113N	74	0622A	00168	00168	MB		F			
NAMI PSCLA	81113N	74	0751A	00203	00203	MB		F			
H MEMPHIS	81211N	74	60002	60002	60002	MC	LC	F	U		
H ST ALBAN	81211N	74	60008	60008	68101	MC	LC	F	U		
H BEAUFORT	81211N	74	61337	61337	61337	MC	LC	F	U		
H STMO BAY	81211N	74	61564	61564	61564	MC	LC	F	U		
NSMC NLNDN	81212N	74	61726	61726	00129	MC	LC	F	U	ME	
NDC WASH	81216N	74	62312	62312	00171	ME	LC	F			
NDC P HARB	81216N	74	62313	62313	00604	ME	LC	F			
NDC GUAM	81216N	74	62328	62328	68096	ME	LC	F			
NDC GTMO	81216N	74	62333	62333	61564	ME	LC	F			
H YOKOSUKA	81211N	74	62499	62499	68292	MC	LC	F	U		
NDC CPNDLT	81216N	74	G2594	62594	62594	ME	LC	F			
FLDBR PHIL	81216N	74	62645	62645	68101	ME	LC	F			
NRDC NRFLK	81216N	74	62753	62753	62753	ME	LC	F			
NDC PHILA	81216N	74	62842	62842	00288	ME	LC	F			
NDYCC JAX	81216N	74	62873	62873	00207	ME	LC	F			
NDC LBEACH	81216N	74	62947	62947	00244	ME	LC	F			
NDYCC ALME	81216N	74	62989	62989	00236	ME	LC	F			
NPMU7 NAPL	81216N	74	62997	62997	66096	ME	LC	F			
NPMU2 NFLK	81216N	74	63117	63117	00189	ME	LC	F			
NOSTA WMBG	81216N	74	63439	63439	00189	ME	LC	F			
NMDSC BTHS	81216N	74	65126	65126	00168	ME	LC	F			
H ROSE RDS	81211N	74	65428	65428	65428	MC	LC	F	U	ME	
H SUBIC BY	81211N	74	65491	65491	00651	MC	LC	F	U		
H ORLANDO	81211N	74	65492	65492	65492	MC	LC	F	U		
NDC CHLSTN	81216N	74	65999	65999	68084	ME	LC	F			
NDCENT SDG	81216N	74	66022	66022	00244	ME	LC	F			
NDC NEWPRT	81216N	74	66023	66023	62661	ME	LC	F			

TABLE 3-1

UIC	PE	FY	CHG	EOB	AAA	BCC				
H LEMOORE	81211N	74	66095	66095	66095	MC	LC	F	U	
H NAPLES	81211N	74	66096	66096	66096	MC	LC	F	U	
H PAX RIVR	81211N	74	66098	66098	66098	MC	LC	F	U	
H PT HUNME	81211N	74	66099	66099	66099	MC	LC	F	U	
H ROTA	81211N	74	66101	66101	66101	MC	LC	F	U	
H TAIPEI	81211N	74	66102	66102	66102	MC	LC	F	U	
NRMC PTSVA	81212N	74	66181	66818	66818	MC	LC	F	U	ME
NRMC SDGO	81212N	74	68056	68056	68056	MC	LC	F	U	MA
NRMC CHLSN	81212N	74	68084	68084	68084	MC	LC	F	U	ME
NRMC JAX	81212N	74	68085	68085	68085	MC	LC	F	U	
NRMC NWPRT	81212N	74	68086	68086	68086	MC	LC	F	U	ME
NRMC WSHDC	81212N	74	68087	68087	68087	ME	LC	F		
NRMC LGBCH	81212N	74	68090	68090	68090	MC	LC	F	U	
NRMC GTLKS	81212N	74	68092	68092	68092	MC	LC	F	U	MA
NRMC LEJNE	81212N	74	68093	68093	68093	MC	LC	F	U	
NRMC PENDL	81212N	74	68094	68094	68094	MC	LC	F	U	
NRMC BWASH	81212N	74	68095	68095	68095	MC	LC	F	U	ME
NRMC GUAM	81212N	74	68096	68096	68096	MC	LC	F	U	
NRMC OAK	81212N	74	68097	68097	68097	MC	LC	F	U	ME
NRMC PEARL	81216N	74	68098	68098	00604	ME	LC	F		
NRMC PHILA	81212N	74	68101	68101	68101	MC	LC	F	U	ME
SCHOL-PROB	81113N	74	68205	68205	00168	MB				
NRDC GTLKS	81216N	74	68326	68326	68092	ME	LC	F		

TABLE 3-2
INPATIENT STATISTICS
OCCUPIED BED DAYS

UIC	ADU	DEP	RET	RET DEP	OTHER	TOTAL COST ($)	UNIT COST ($)
00105	8024	3406	2001	2092	206	1759389	111
00112	24976	3450	9860	5979	509	0	0
00162	4645	1811	1233	1369	25	1591375	175
00168	71172	23766	28394	26338	3174	11424409	74
00203	24106	7889	7627	5563	131	4304018	94
00231	5581	5250	1164	1727	25	2095310	152
00267	7505	3419	1451	1104	9	1676122	124
00285	11048	3778	2077	2036	1029	2261809	113
0499A	0	0	0	0	0	296792	0
0608A	0	0	0	0	0	1313	0
0619A	0	0	0	0	0	987	0
0620A	0	0	0	0	0	0	0
0621A	0	0	0	0	0	0	0
0622A	0	0	0	0	0	1119	0
0751A	0	0	0	0	0	55186	0
60002	16522	4573	2615	3547	57	4078847	149
60008	3312	0	276	276	0	1523191	394
61337	5515	5515	1445	1668	25	3196593	225
61564	2574	1341	46	3	1803	1271399	220
61726	15661	2345	478	514	18	2551560	134
62499	21004	9063	747	377	1310	2136371	65
65428	7685	2830	759	1270	466	2318921	178
65491	19746	4352	478	512	1132	1085844	41
65492	22434	3074	7853	6875	21	4279801	106
66095	6250	2893	345	595	0	1294279	128
66096	12300	4508	19	79	566	1574235	90
66098	1800	2533	279	447	14	1080253	212
66099	2880	3657	1206	1683	7	1383039	146
66101	3674	3289	279	15	180	876279	117
66102	4540	4527	19	266	685	826639	82
66818	132486	40410	21363	16587	663	15920718	75
68056	265120	30785	32048	19288	2082	19726416	56
68084	39003	13274	6370	6827	461	5590955	84
68085	41036	10723	8093	6467	577	5772953	86
68086	31379	5806	3456	2552	175	4587920	105
68090	72077	4819	10275	7955	900	6198363	64
68092	67769	10012	10121	7702	577	8450974	87
68093	44308	17709	3449	3082	28	6521955	95
68094	38900	18313	6748	1917	134	6537303	99
68095	21287	5422	3405	3723	19	3655613	107
68096	8451	6568	580	1221	3048	3142736	158
68097	79635	14627	14848	13808	1172	12599655	101
68101	110700	11535	21014	11921	13872	12507948	73
TOTAL	1255105	297272	212421	167385	35080	166158589	84

TABLE 3-3
OUTPATIENT STATISTICS
OUTPATIENT VISITS

UIC	ADU	DEP	RET	RET DEP	OTHER	TOTAL COST ($)	UNIT COST ($)
00105	24015	34481	5560	11688	28083	1555315	14
00112	9895	14315	10627	17803	906	0	0
00162	60118	26140	10088	16167	1862	1267014	11
00168	103863	173734	47999	75186	25608	2918125	6
00203	89124	98390	23992	41121	10766	2766550	10
00231	63031	71441	5555	12144	2763	1463158	9
00267	21738	35028	4424	7743	818	939620	13
00285	51147	58797	9971	12194	8718	1846222	13
0499A	0	0	0	0	0	167055	0
0608A	0	0	0	0	0	0	0
0619A	0	0	0	0	0	0	0
0620A	0	0	0	0	0	0	0
0621A	0	0	0	0	0	0	0
0622A	0	0	0	0	0	0	0
0751A	0	0	0	0	0	89182	0
60002	77820	54085	8444	20854	1045	1643338	10
60008	3310	4664	4259	7334	446	42185	2
61337	183462	51541	4021	7892	618	1528984	6
61564	16183	15169	92	21	7558	256380	6
61726	45328	74373	4793	9628	1305	789136	5
62499	46180	46988	1269	767	5483	1725487	17
65428	18753	23698	6433	5955	3844	696666	11
65491	70694	35899	2222	1374	26662	910616	6
65492	104004	29185	25101	57333	986	2668646	12
66095	17150	41768	1579	2746	527	425352	6
66096	14456	38235	405	752	3599	537448	9
66098	18349	33789	2371	2902	1114	511610	8
66099	31646	51617	15039	21481	14736	850171	6
66101	12423	36653	890	798	6027	443971	7
66102	6640	21421	435	562	3043	542605	16
66818	226944	501002	56307	80139	39181	9545123	10
68056	465307	305601	70543	79374	33226	11846363	12
68084	57213	130967	14747	21002	12883	2567979	10
68085	78760	163825	31325	43598	9572	3775719	11
68086	52387	101508	13435	16450	6941	1695427	8
68090	118640	116575	45677	77402	27618	3952441	10
68092	131041	94518	18348	26276	5538	4196492	15
68093	235601	200621	13556	9625	11499	3133150	6
68094	212753	114376	25359	30169	5326	2346236	6
68095	47908	79603	19445	34532	44131	2611426	11
68096	29800	47450	3380	5684	10672	1161682	11
68097	146388	181368	54233	98915	57363	7041049	13
68101	90707	75175	28893	39495	45120	3938857	14
TOTAL	2980778	3184000	590817	897106	465587	84396786	10

unit cost rises to $87 per OBD. Finally, those activities primarily engaged in teaching (identified by UIC's ending in A) report no workload and some costs. As is shown in Table 3-2 the total direct expenditure for inpatient care was more than $166 million for these three quarters.

Table 3-3 reports the outpatient statistics. For each UIC the number of outpatient visits has been reported for each beneficiary group. The last two columns report total cost allocated to outpatient services and the unit cost. The total was approximately $84 million, and the unit cost was equal to $10.40. The same data problems discussed above also exist here, however, and if we delete Chelsea, Bethesda, and St. Albans, the unit cost rises to $10.66.

Not included in the above outpatient expenditures are those occuring at the Navy Medical Regional Clinic at Pearl Harbor. They amounted to $3,488,522.

Finally, one further adjustment must be made to the inpatient statistics. This was discussed in Chapter 2.0 and was dealt with extensively in our earlier report, Navy Medical Care Study - Costs and Economic Efficiency. It is due to the fact that both continuous care and rehabilitative care occur in Navy hospitals. Applying the same assumption used in both Chapter 2.0 and our earlier report (i.e., that on the average rehabilitative care begins after the 10th day and the cost of rehabilitative care is $20 per day) more meaningful statistics can be generated. This has been done in Table 3-4. With this adjustment the unit cost for acute care has been calculated and is shown in the final column. For all activities the cost of the continuous care is $118

TABLE 3-4
ADJUSTED INPATIENT DATA

U1C	CONT. CARE OBD	REHAB OBD	REHAB COST ($)	CONT.CARE COST ($)	UNIT COST ($) REHAB	UNIT COST ($) CONT. CARE
00105	12535	3194	63880	1695509	20	135
00112	26948	17826	356520	-356520	20	-13
00162	9083	0	0	1591375	0	175
00168	104542	48302	966040	10458369	20	100
00203	33050	12266	245320	4058698	20	122
00231	13747	0	0	2095310	0	152
00267	9823	3665	73300	1602822	20	163
00285	15770	4198	83960	2177849	20	138
0499A	0	0	0	296792	0	0
0608A	0	0	0	1313	0	0
0619A	0	0	0	987	0	0
0620A	0	0	0	0	0	0
0621A	0	0	0	0	0	0
0622A	0	0	0	1119	0	0
0751A	0	0	0	55186	0	0
60002	19182	8132	162640	3916207	20	204
60008	1472	2392	47840	1475351	20	1002
61337	14168	0	0	3196593	0	225
61564	5767	0	0	1271399	0	220
61726	7905	11111	222220	2329340	20	294
62499	25587	6914	138280	1998091	20	78
65428	10835	2175	43500	2275421	20	210
65491	24404	1816	36320	1049524	20	43
65492	40257	0	0	4279801	0	106
66095	8043	2040	40800	1253479	20	155
66096	17292	180	3600	1570635	20	90
66098	5073	0	0	1080253	0	212
66099	9433	0	0	1383039	0	146
66101	7437	0	0	876279	0	117
66102	7567	2470	49400	777239	20	102
66818	126373	85136	1702720	14217998	20	112
68056	195753	153570	3071400	16655016	20	85
68084	46282	19653	393060	5197895	20	112
68085	45730	21146	422920	5350033	20	116
68086	22929	20439	408780	4179140	20	182
68090	45949	50077	1001540	5196823	20	113
68092	70682	25499	509980	7940994	20	112
68093	51498	17078	341560	6180395	20	120
68094	48712	17300	346000	6191303	20	127
68095	22429	11427	228540	3427073	20	152
68096	19868	0	0	3142736	0	158
68097	73555	50535	1010700	11588955	20	157
68101	89312	79730	1594600	10913348	20	122
TOTAL	1288992	678271	13565420	152593169	0	118

per day. If Bethesda, Boston and St. Albans are omitted from the sample, the cost of continuous care would be $121 per day.

We have also included Table 3-5, the Expense Summary. It reports the proportion of expenses occurring at the UIC's reporting in the EOB that is allocated to inpatient and outpatient services. The column labeled "Unallocated" includes the expenses for other services of the Navy health care delivery system. These include public health, research, training and some administration.

3.1.2 CHAMPUS

Appendix F reports that for the first three quarters of FY 1974 BUMED had expended $57,865,584 for the program element 81214, CHAMPUS. However, this reported figure is much too low due to the reporting lag of the total Navy liability incurred under this program. After professional service is rendered to a qualified beneficiary, it generally takes three to six months for a claim to be filed by the physician, and processed by financial intermediaries before it is finally reported to OCHAMPUS in Denver.

We have secured from OCHAMPUS the three quarters of expenditure data that had been processed through June 30, 1974. Hence, while all claims still had not been processed, a much larger portion of them are reported then in Appendix F. We have summarized this data from the Statistical and Financial Phaseback Reports as part of Table 3-7. For inpatient care the Navy has spent in excess of $86 million. Including the patient's share of these costs for professional services and hospital care, total expense has been $106,180,338. For outpatient care the Navy's three

TABLE 3-5
EXPENSE SUMMARY

(1) UIC	(2) INPATIENT ($)	(3) OUTPATIENT ($)	(4) UNALLOCATED ($)	(5) TOTAL ($)	(6) (4)/(5)
00105	1759389	1555315	207960	3522664	.06
00112	0	0	0	0	.00
00162	1591375	1267014	34495	2892884	.01
00168	11424409	2918125	1938176	16280710	.12
00203	4304018	2766556	570617	7641191	.07
00231	2095310	1463158	197037	3755505	.05
00267	1676122	939620	179993	2795735	.06
00285	2261809	1846222	895766	5003797	.18
0499A	296792	167055	52088	515935	.10
0608A	1313	0	895	2208	.41
0619A	987	0	13008	13995	.93
0620A	0	0	557110	557110	1.00
0621A	0	0	38486	38486	1.00
0622A	1119	0	11330	12449	.91
0751A	55186	89182	357335	501703	.71
60002	4078847	1643338	84895	5807080	.01
60008	1523191	42185	1092321	2657697	.41
61337	3196593	1528984	298534	5024111	.06
61564	1271399	256380	71880	1599659	.04
61726	2551560	789136	248263	3588959	.07
62499	2136371	1725487	537479	4399337	.12
65428	2318921	696666	31368	3046955	.01
65491	1085844	910616	94027	2090487	.05
65492	4279801	2668646	243740	7192187	.03
66095	1294279	425352	96045	1815676	.05
66096	1574235	537448	43602	2155285	.02
66098	1080253	511610	8510	1600373	.01
66099	1383039	850171	129868	2363078	.06
66101	876279	443971	16187	1336437	.01
66102	826639	542605	139358	1508602	.09
66818	15920718	9545123	2487023	27952864	.09
68056	19726416	11846363	3254581	34827360	.09
68084	5590955	2567979	511104	8670038	.06
68085	5772953	3775719	830882	10379554	.08
68086	4587920	1695427	479313	6762660	.07
68090	6198363	3952441	1922856	12073660	.16
68092	8450974	4196492	1112597	13760063	.08
68093	6521955	3133150	110409	9765514	.01
68094	6537303	2346236	664908	9548447	.06
68095	3655613	2611426	416194	6683233	.07
68096	3142736	1161682	106036	4410454	.02
68097	12599655	7041049	3043520	22684224	.13
68101	12507948	3938857	1293899	17740704	.07
TOTAL	166158589	84396786	24423695	274979070	.09

quarter liability has been approximately $10.5 million. Again if we add in those expenses paid for by the patient, the total cost for outpatient care rises to $16,475,839. Also some dental care is reported in the outpatient category which in total costs $256,722. There is a handicapped program to which there is no equivalent in the Navy hospitals. For the first three quarters of FY 1974 under this program the total Navy liability is $3,662,507.

TABLE 3-6

TOTAL EXPENDITURES - CHAMPUS

Inpatient	patient	20,058,538	24.84/day
	government	86,121,800	109.67/day
		$106,160,338	$134.51/day
Outpatient	patient	6,015,782	11.84/visit
	government	10,460,057	20.58/visit
		$ 16,475,839	$ 32.42/visit
Dental	patient	88,157	
	government	168,565	
		$ 256,722	
Handicapped Program		1,665,213	
		3,662,507	
		$ 5,327,720	

3.1.3 Care in Non-Service Facilities

This program element (81215) is used to fund services that the Navy purchases from outside of DOD for the active duty personnel. For example, Navy and Marine Corps personnel may receive care in Veterans Hospitals or through the Public Health Service. In that case a transfer occurs between these Federal agencies. The amount of this purchase reported by BUMED for the first three quarters in Appendix F is $6,444,847. We have been unable to ascertain what impact any reporting lag might have on this figure.

3.1.4 Dental and Ophthalmic Services

The Navy delivers dental services in clinics, hospitals, and medical centers. The easiest to deal with are the dental clinics. There are nine Naval dental clinics (Washington, Pearl Harbor, Guam, Guantanamo Bay, Camp Pendleton, Philadelphia, Long Beach, Charleston, and Newport) plus the Naval Regional Dental Center in Norfolk and the Naval Dental Center at San Diego. The sum of their expenditures for the first three quarters of FY 1974 was $11,480,872. (For details see Appendix F.)

In the hospitals and medical centers both inpatient and outpatient dental care is provided. The expenses for the inpatient dental care have been allocated to the inpatient expenses, and the occupied bed days occurring due to dental patients are similarly allocated to the OBD count. In other words, inpatient dental care is treated the same as any other inpatient care. Since this is the practice adopted by both BUMED and CHAMPUS, we can see no reason to tamper with it.

Outpatient dental care however, is another matter. There apparently is some problem of consistency with the Expense Operating Budget that we have not been able to satisfactorily solve. We are still working on it. The problem is that the expenditures for outpatient dental care are allocated to the outpatient cost center. EOB Report MO2 states that for the second quarter of FY 1974 the direct expenses allocated to cost center 50 for dental care amounted to $493,497. If we assume that equal amounts were allocated to this cost center for the other two quarters of FY 1974, approximately 1.75 percent of the expenses in the outpatient services cost center were for dental care.

It is less clear how the dental workload has been treated. First of all, we have had trouble determining whether the workload unit employed has been dental procedures or dental sittings (there are approximately three procedures per sitting, on average). Secondly, we do not know whether the outpatient visit tally includes some procedures and/or sittings. If sittings and/or procedures are not included within the outpatient workload, our estimated cost of outpatient visits is between one and two percent higher than actual. Hence while this problem should be solved, it apparently will not generate a large bias in estimates of outpatient care cost based on the data discussed above.

The Navy Ophthalmic Center is located at Williamsburg, Virginia. This is a training activity as well as one that produces lenses and other ophthalmic apparatus. Its total expense for the first three quarters was $2,152,959. This amount, summed with the expenses of the Naval dental clinics and our estimate of the outpatient dental expenses at hospitals and medical centers, totals $15,114,322.

3.1.5 Public Health

There are three broad categories of expenditures for public health. Two of these are identified by the EOB. Cost center 70 reports the expenditures for "other non-hospital and medical support functions." It includes, among other things, expenditures for disaster control, mobile dental units, and other functions generally associated with public health. However, it also includes some other non-hospital support functions such as operating the officers mess and some maintenance of real property. We have not been able to identify these "non-public

health" expenditures, however, and have assumed that they are minimal. As a result the $8,772,989 allocated to this cost center may overstate the amount of public health purchased.

The second service the EOB reports that can be classified as public health is drug abuse. For the first three quarters of FY 1974 the total for this category was $2,155,762. In sum the EOB reports what we would term public health expenditures to be equal to $11,138,980.

The Bureau of Medicine and Surgery also makes some direct expenditures that we can classify as public health. They include expenses for care of the dead, and transportation of biological samples and some patients. Appendix F reports the total of these costs for the first three quarters to be $1,794,358.

A final set of expenditures for public health are those which are used to finance the preventive medical units (PMU) and disease vector control centers (DVCC). These are identified explicitly in Appendix F under program element 81216, Other Medical Activities. This sum total of expenditures for these four PMU and two DVCC units for the first three quarters of FY 1974 is $1,703,973. Hence the total expenditure for public health is $14,637,371.

3.1.6 Research

There are two sources of funding for research occurring in Navy hospitals and medical centers. The first of these is the Clinical Investigation Program (CIP) which is included within the appropriations for hospitals and medical centers (or program elements 81211 and 81212). The second

source is the appropriation for Research, Development, Test and Evaluation (RDTE). The EOB identifies that, for CIP, $560,536 were expended while the total for RDTE was $1,100,357. After invoking the adjustment to allocate capital, costs for maintenance of personnel quarters, and the All-Volunteer Forces expenses, total expenditure for research was $1,603,210.

3.1.7 Training

Training expenses are categorized in a number of different ways. The EOB has three cost centers that report the expense for general education and training, the maintenance and administration of enlisted schools, and the maintenance and operation of officers' schools at San Diego and Great Lakes. Professional training occurs at the Navy facilities at Pensacola and in Bethesda at the Navy Medical School (often referred to as the Medical Training Institute), the Navy Dental School, and the Navy School of Health Care Administration. The cost of the students' time, however, is not reported at either of these specialized or professional training facilities. Hence this is another source of expenditures. Finally, some training occurs directly in the civilian sector. These expenditures are centrally managed by BUMED.

Due to the complexity of the source of funding, we have created Table 3-7 to describe the magnitude of the expenditures. As Appendix E indicates that the sum of the expenditures for education and training, and the operation and administration of enlisted and officers training programs, was $11,964,489. Following the capital, quarters, and AVF adjustment, and deleting the expenses for the hospital corps schools, the Navy professional training facilities (which were erroneously reported and are treated separately below) and San Diego and Great Lakes, the

TABLE 3-7 - TRAINING EXPENSES

Education and Training		4,968,916
Administration and Operation of Enlisted Schools		1,205,989
Administration and Operation of Officer Schools		6,059,584
Sub Total		11,964,489
Adjustments		-381,655
EOB Total		11,582,834
Hospital Corps Schools	SD60	2,094,449
	GTLKS	1,769,489
Sub Total		3,863,938
Students "Composite Rate" Cost		11,700,750
Professional Training		
Bethesda	NMS	1,943,242
	NDS	1,644,711
	NSHA	336,078
Pensacola	NAMI	1,344,187
Sub Total		5,268,218
Students "Composite Rate" Cost		5,229,369
Centrally Managed Training in Civilian Teaching Institutions		11,190,567
TOTAL		$48,815,673

the expense of training at hospitals and medical centers was determined to be $11,582,834. BUMED has supplied us with actual data for the net cost of operating the hospital corps schools and the professional training facilities for the first three quarters of FY 1974. These, too, are reported in Table 3-7. However, in addition to these expenditures the cost of the student's time must also be considered. (For detailed justification see our earlier report, Navy Medical Care Study - Costs and Economic Efficiency.) Our estimate for the three quarters of FY 1974 is $16,910,110. It was derived by multiplying the student load by our estimate (a weighted average) of the composite rate.

Finally, the training in the civilian institutions is centrally managed by BUMED. Appendix F indicates that the sum of these expenditures by BUMED and the scholarship program for the first three quarters is $13,357,604. However, $2,167,040 of these expenses were actually reimbursements to their schools. To avoid double-counting, we have reduced the cost of training by this amount.

The sum total of expenditures for training, then, from all of the above described sources is $48,815,673.

3.1.8 Administration

The final category of expenditures is for administration of the program. Here we are not referring to the administration at each hospital, medical center or clinic; rather, we are referring specifically to BUMED's function, to the required communications network, and to the automated data processing that occurs at the Navy Medical Data Services Center at

Bethesda. Appendix F indicates that for program element 88098, Command, BUMED spent in the first three quarters $5,763,265. Communications, which is program element 81215, amounted to $2,077,325. The Navy Medical Data Services Center cost $955,049. The Field Branch at Philadelphia, an administrative unit, reports expenses of $393,435. The sum of the above expenditures for the first three quarters was $9,188,124.

3.1.9 Summary

Figure 3-8 summarizes the above discussion of total expenditures. Seven functions have been recognized: inpatient services, outpatient services, dental and ophthalmic services, research, public health, training, and administration. For each function the total expenditures have been identified and, in the case of inpatient and outpatient services, unit costs have been estimated.

We do not regard all these functions as final outputs. As we have argued elsewhere, both training and administration do not occur as ends in themselves but, rather, support the other activities which are final outputs. Because these should be regarded, then, as intermediate products, their cost must be allocated to the final outputs. An example of how this might be done is shown on Figure 3-9 . It is similar to Figure 3-8 except that those expenses for the support programs of training and administration have been allocated against the other five outputs (excluding CHAMPUS) in proportion of each output's expenditure.

We have made an adjustment to recognize that not all of the manpower trained is used in Navy hospitals. The corpsman detailer has informed us that the distribution of their billets on 31 March 1974 was as follows:

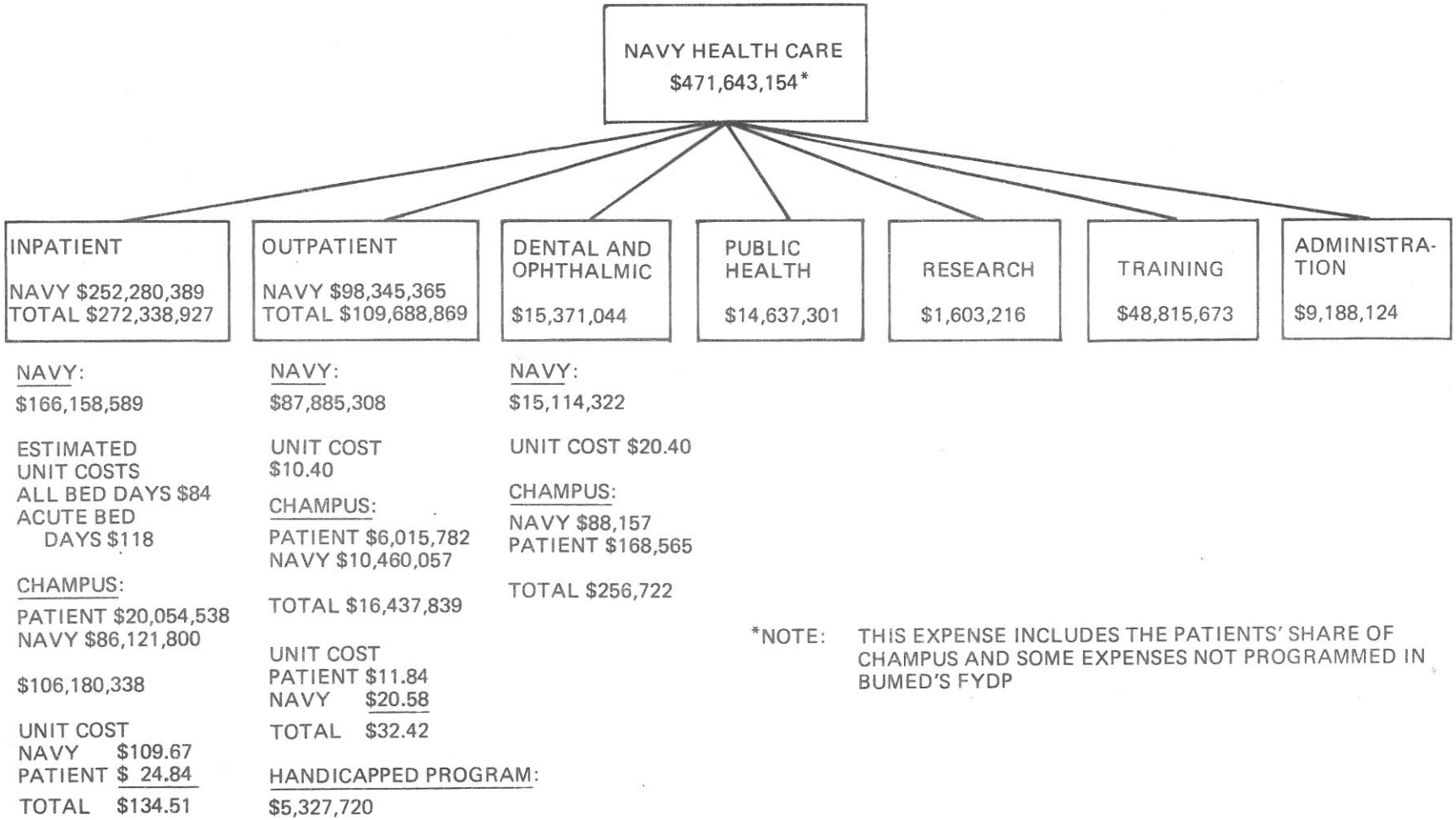


FIGURE 3-8 ANALYSIS OF OMN AND MPN EXPENDITURES FOR HEALTH CARE OUTPUTS (FY 74, FIRST THREE QUARTERS)

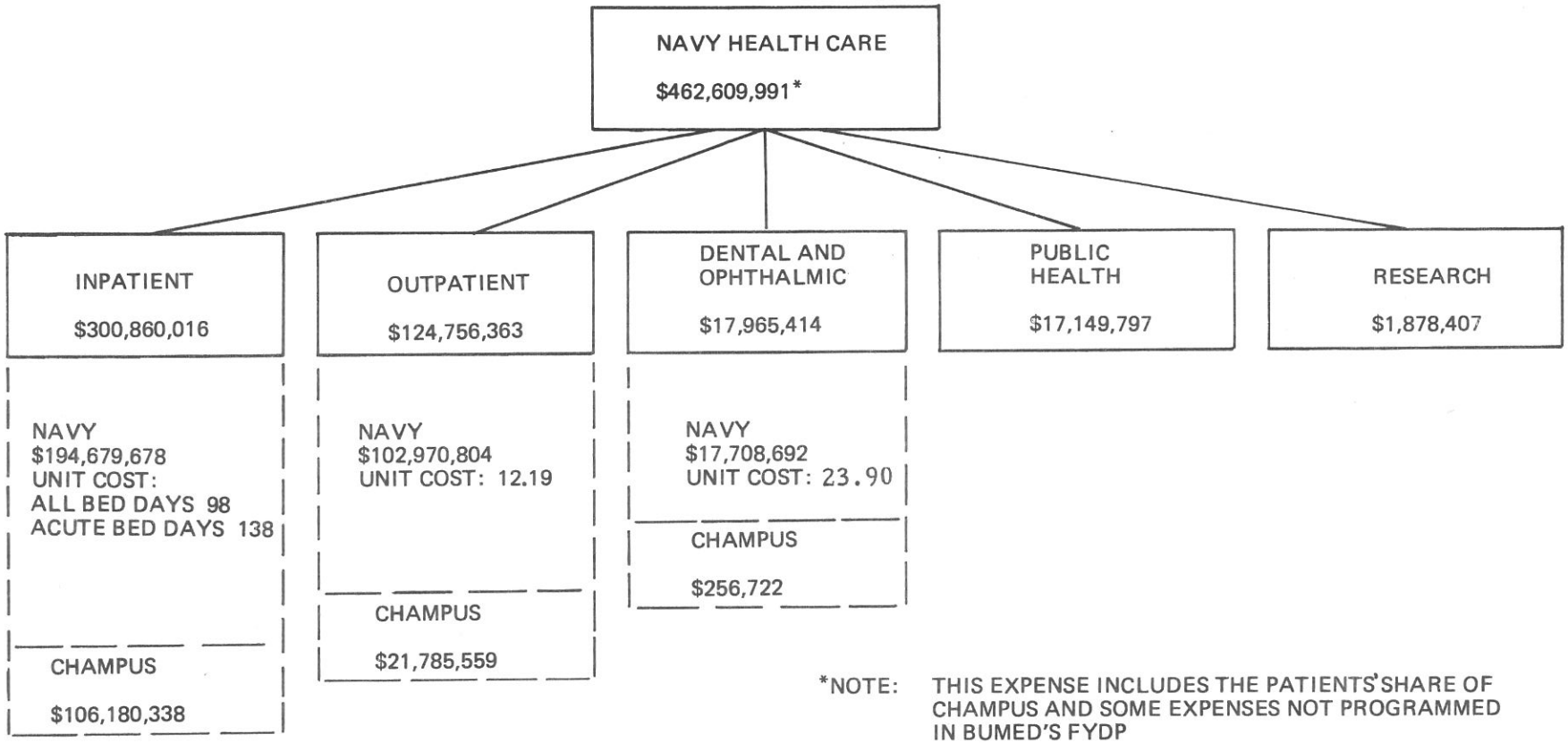


FIGURE 3-9 ANALYSIS OF OMN AND MPN EXPENDITURES FOR FINAL HEALTH CARE OUTPUTS (FY 74, FIRST THREE QUARTERS)

student - 3437; transit, patient and prisoner (TPP) - 1018; LANTFLT - 3485; PACFLT - 4085; CONUS - 12751; TAR - 241. The total was 25017. The Medical and Dental Officer Billet Requirements Study Report of 1 June 1973 stated that the medical officer billets were distributed on 31 January 1973 as follows: PACFLT and LANTFLT (or Operational and Direct Operational Support) - 899; TPP - 153; CONUS (Bases and Stations, Staffs, Air Station, R&D and Training) - 3120; Other - 114. The total was 4286. However some of the PACFLT and LANTFLT are U. S. Navy hospitals whose expenses are included here. It appears from the above data that about 70 percent of the productive personnel are working for BUMED. Therefore we have allocated only 70 percent of the training expense to these outputs.

This discussion also points to an additional administrative expense - TPP billets. These have not been included to this point, but should be recognized. Again we assume that 70 percent of these result from the Bureau's operation and that the representative rank of individuals in these billets are E-4 (Composite rate: $7800) and O-3 (Composite rate: $18695). Their cost is $7,560,514 on an annual basis, or $5,670,386 adjusted to reflect three quarters expense.

In the case of the inpatient, outpatient and dental services, the impact on unit costs have been noted. After this allocation the resulting estimate of a cost for acute inpatient care is $142 per day, for outpatient care $12, and for dental sitting $24.*

* As is discussed in Appendix D, not all of the overhead charges at Navy Hospitals and Medical Centers that should be shifted from inpatient to outpatient cost centers are shifted. The result is that the cost of inpatient care is somewhat overstated and outpatient costs understated.

3.2 COST ANALYSIS

Our analysis is based on the standard economic contention that marginal cost is the most relevant aspect of cost analysis -- marginal cost representing the cost of adding (or saving from subtracting) one unit of output from any specified total. In those cases where we have estimated fixed and marginal costs (inpatient care, outpatient care, dental care, and training), we have used linear regressions analysis. In this analysis, the intermediate products have not been allocated to the final output. The theoretical underpinnings of the technique are discussed in Appendix A, Explanation of Analytical Techniques Used to Quantify Cost Behavior.

3.2.1 Inpatient Care

Earlier (see Navy Medical Care Study - Costs and Economic Efficiency, Chapter 5.0) we argued that it was better to estimate the marginal costs for inpatient care in terms of authorized operating beds rather than occupied bed days or average daily patient load. The use of occupied bed days tends to confuse the issue. This results because, in the short run, when the capacity of the hospital has been determined and it is staffed and equipped, expenses do not vary with the number of occupied bed days -- the marginal cost is approximately zero. However, this is a very short-run analysis. When the capacity of the medical facility is allowed to change (such as by changing the authorized beds and concomitantly its staff and equipment) there are significant variable costs. We still think this argument has general validity. However, operationally the number of authorized beds at any Navy hospital or medical center is equal to 1.25 times the average daily patient load, i.e., an 80 percent occupancy is maintained by arbitrarily altering the number of authorized beds. Because of this simple transformation, it becomes straightforward to use either the average daily patient load or the number of occupied

bed days occurring in a quarter (which is equal to 91.25 times the average daily patient load) as the measure of the capacity of the facility. Since these are also the variables we have employed to project the demand or the required amount of medical services, it is simpler to use the number of occupied bed days as the explanatory variable.

The data source is Table 3-4, which reports our estimate of the cost of care after factoring out the $20 per day cost of rehabilitative care. For all analysis of inpatient costs, we have deleted from the sample all UIC's reporting zero expenses or outputs and Bethesda and St. Albans. Equation 1 estimates the total fixed and marginal costs of providing continuous care. The estimate is a fixed cost of $947,309 for nine months (or $1,263,078 at an annual rate) for each medical region. The marginal cost of providing acute care per occupied bed day was $94.63. As can be seen by the value of R^2, 92 percent of the variance of the adjusted total dollars has been explained by this equation. Standard statistical tests indicate both coefficients are highly significant.

1) $$\text{ADJ TOTAL\$} = \underset{(t=3.55)}{\$947,309} + \underset{(t=18.70)}{\$94.63}\ (\text{Cont. Care OBD}) \qquad R^2 = .92$$

The above estimates can be decomposed by two methods. The first is to separately identify how salaries (both MPN and civilian) vary as opposed to the expenditures for all items other than salaries. Equations 2 and 3 below show these results. Equation 2 shows that of the total marginal cost of Equation 1, $69.17 went for salaries, the remainder being for the other OMN expenditures less civilian salaries. The fixed costs are similarly decomposed into $710,538 for salaries and $236,769 for the other expenses, both of these being on a nine month basis. Again all coefficients are significant and the values of R^2 indicate good explanatory power for these equations.

2) ADJ SAL$ = $710538 + $69.17 (Cont. Care OBD) R^2 = .89
(t=3.05) (t=15.66)

3) ADJ(TOTAL$-SAL$) = $236769 + $25.46 (Cont. Care OBD) R^2 = .94
(t=3.89) (t=22.06)

The second possible decomposition is strictly to follow appropriations categories. Conceptually this is less satisfactory than the decomposition in Equations 2 and 3 because military and civilian personnel are extremely good substitutes for each other. They are both labor and hence should be treated as one resource as they are in Equations 2 and 3. However, this is not the way resources are programmed and hence, while Equations 4 and 5 are the less "correct" specification, they provide the estimates required for determining resource requirements. Equation 4 reports that the marginal cost attributed to the MPN appropriation is $47.35. The fixed cost is $582,398. The remainder, of course, is the OMN appropriation. Equation 5 estimates that the remaining marginal cost per acute care occupied bed day is $47.28 and the fixed cost is $364,510. All the coefficients are significant and both equations explain approximately 90 percent of the variance of the dependent variables.

4) ADJ MPN$ = $582,398 + $47.35 (Cont. Care OBD) R^2 = .90
(t=3.99) (t=17.11)

5) ADJ TOTAL$ - MPN$ = $364,910 + $47.28 (Cont. Care OBD) R^2 = .92
(t=2.80) (t=19.08)

Equations 1-3 are graphed on Figure 3-10. Equations 1, 4 and 5 are plotted on Figure 3-11.

Similar results for inpatient care can be derived by dropping one of the constraints imposed in each of the first set of five equations. Those equations were estimated based on an imposed requirement that the cost of a rehabilitative occupied bed day was $20. Using Table 3-2,

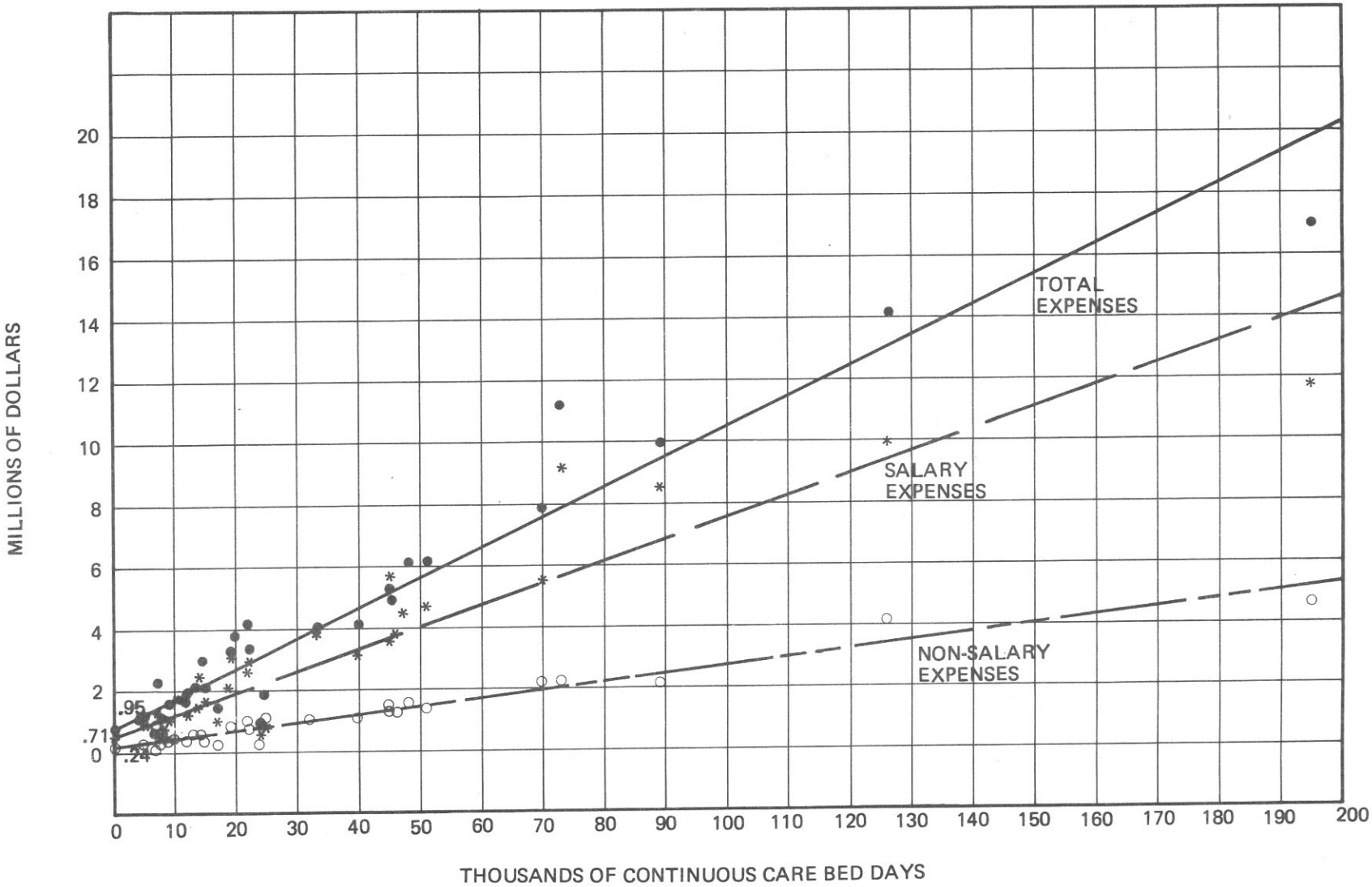


FIGURE 3-10 THE COST-OUTPUT RELATIONSHIP FOR INPATIENT CARE (EQUATIONS 1, 2, 3)

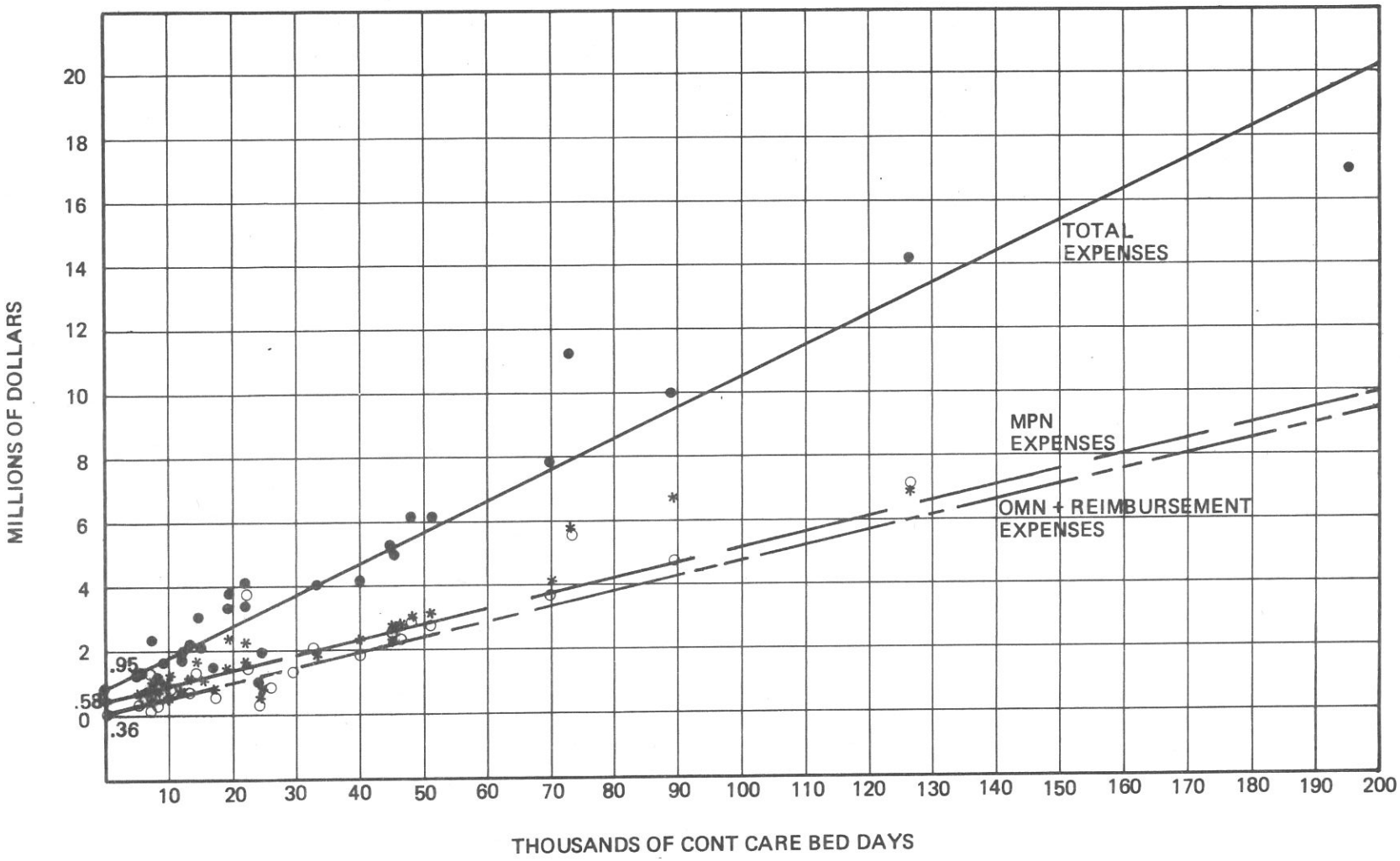


FIGURE 3-11 THE COST OUTPUT RELATIONSHIP FOR INPATIENT CARE BY APPROPRIATION CATEGORY (EQUATIONS 1, 4, 5)

equation 6 allows the data to estimate this cost. The result is a somewhat higher estimate of $28.92 per rehabilitative occupied bed day. The standard error of this estimate is large, however, implying that standard statistical tests could not reject the hypothesis that the cost of a rehabilitative bed day was $20. The total marginal cost of an acute care occupied bed day was estimated to be $87.68, approximately $5 less than that estimated under the previously discussed constraint. The fixed costs of $1,025,987 are also somewhat higher. If adjusted to an annual rate, these fixed costs would be equal to $1,367,982.

6) TOTAL$ = $1,025,987 + $87.68 (Cont. Care OBS) + $28.92 (Rehab OBD)
(t=3.13) (t=5.11) (t=1.38)

R^2 = .94

Equation 6 can be decomposed in a manner similar to that used for Equation 1. Equations 7, 8, 9, and 10 report this disaggregation. In each case the equation has a high explanatory power as measured by R^2, with the fixed-cost and marginal-cost estimates for an acute care occupied bed day being significant and those coefficients of the rehabilitative occupied bed day not significant.

7) SAL$ = $807,892 + $60.71 (Cont. Care OBD) + $25.43 (Rehab OBD)
(t=2.78) (t=3.99) (t=1.36)

R^2 = .91

8) TOTAL$-SAL$ = $218,095 + $26.97 (Cont. Care OBD) + $3.48 (Rehab OBD)
(t=2.82) (t=6.68) (t=.71)

R^2 = .95

9) MPN$ = $622,725 + $44.04 (Cont. Care OBD) + $14.37 (Rehab OBD)
(t=3.42) (t=4.63) (t=1.23)

R^2 = .93

10) TOTAL$-MPN$ = $403,261 + $43.64 (Cont. Care OBD) + $14.54 (Rehab OBD)
(t=2.51) (t=5.19) (t=1.41)

R^2 = .94

These two specifications provide similar estimates of the marginal cost of an inpatient acute care occupied bed day. Equation 1 estimates this cost to be approximately $95. Equation 6's estimate is somewhat less than $88. Equation 6 has a higher explanatory power, but this is not surprising as the value of R^2 could not fall when a constraint is relaxed. Equation 6 shows that perhaps $20 is too low a price to allocate to rehabilitative care, but also that the coefficient of acute care is not extremely sensitive to changes in this parameters. That is, while Equation 6 estimates a 46 percent increase in the price of rehabilitative care above the constrained level of $20, it only projects an 8 percent decrease in the marginal cost of an acute occupied bed day.

3.2.2 Outpatient Care

We have used the data in Table 3-3 to estimate the relationship between fixed and marginal costs for outpatient care. The sample used was the same as for inpatient care, with the exclusion of Lemoore with which we had data problems. Equation 11 estimates that the marginal cost of an outpatient visit is $11.26. The fixed cost on a nine month basis was estimated to be $-134,936. We should report that the t-test indicates that this coefficient is not significantly different from zero. Again the equation has a high explanatory power as 92 percent of the variance of the total dollar is accounted for by the equation.

$$11) \quad TOT\$ = \underset{(t=-.70)}{\$-134{,}936} + \underset{(t=18.52)}{\$11.26\ (OPV)} \qquad R^2 = .92$$

The decomposition described previously can be applied. This has been done in Equations 12 through 15. Equation 12 indicates that the marginal cost is predominately composed of salaries. Equation 14 estimates that the MPN appropriation accounts for $6.35 of the total marginal cost of $11.26.

12) SAL$ = $11,439 + $9.37 (OPV) R^2 = .93
(t=.07) (t=19.34)

13) TOT$-SAL$ = $-146,375 + $1.89 (OPV) R^2 = .82
(t=2.80) (t=11.64)

14) $MPN = $86,912 + $6.35 (OPV) R^2 = .91
(t=.77) (t=18.19)

15) TOT$-MPN = $-221,849 + $4.90 (OPV) R^2 = .90
(t=2.33) (t=16.57)

Equations 11 to 13 have been graphed on Figure 3-12, equations 11, 14 and 15 on Figure 3-13.

3.2.3 CHAMPUS

The marginal cost of the services that the Navy purchases for its beneficiaries in the civilian sector is just equal to the average cost or the price the Navy must pay. That is, because the Navy is not producing anything but is buying services from the civilian sector, fixed costs are not a concern. If no services were purchased from the civilian sector than the Navy would incur no liability. However, for each incremental number of services, the incremental liability that the Navy incurs is just equal to the price of the service times the amount of the service purchased. Hence, to forecast total cost changes once the change in workload is known it is only necessary to know the unit cost.

We have previously discussed the determination of the unit cost for inpatient and outpatient services purchased through CHAMPUS and some of the pitfalls an analyst must be aware of. (See our earlier report Navy Medical Care Study - Costs and Economic Efficiency, Chapter 5.0.) Two of the major ones are explicit consideration of the extent of psychiatric care, and the price effects that occur due to the cost sharing provisions of CHAMPUS. Since that earlier discussion is based on data now a year old, some of those prices have changed. However, the increase is not sufficient to

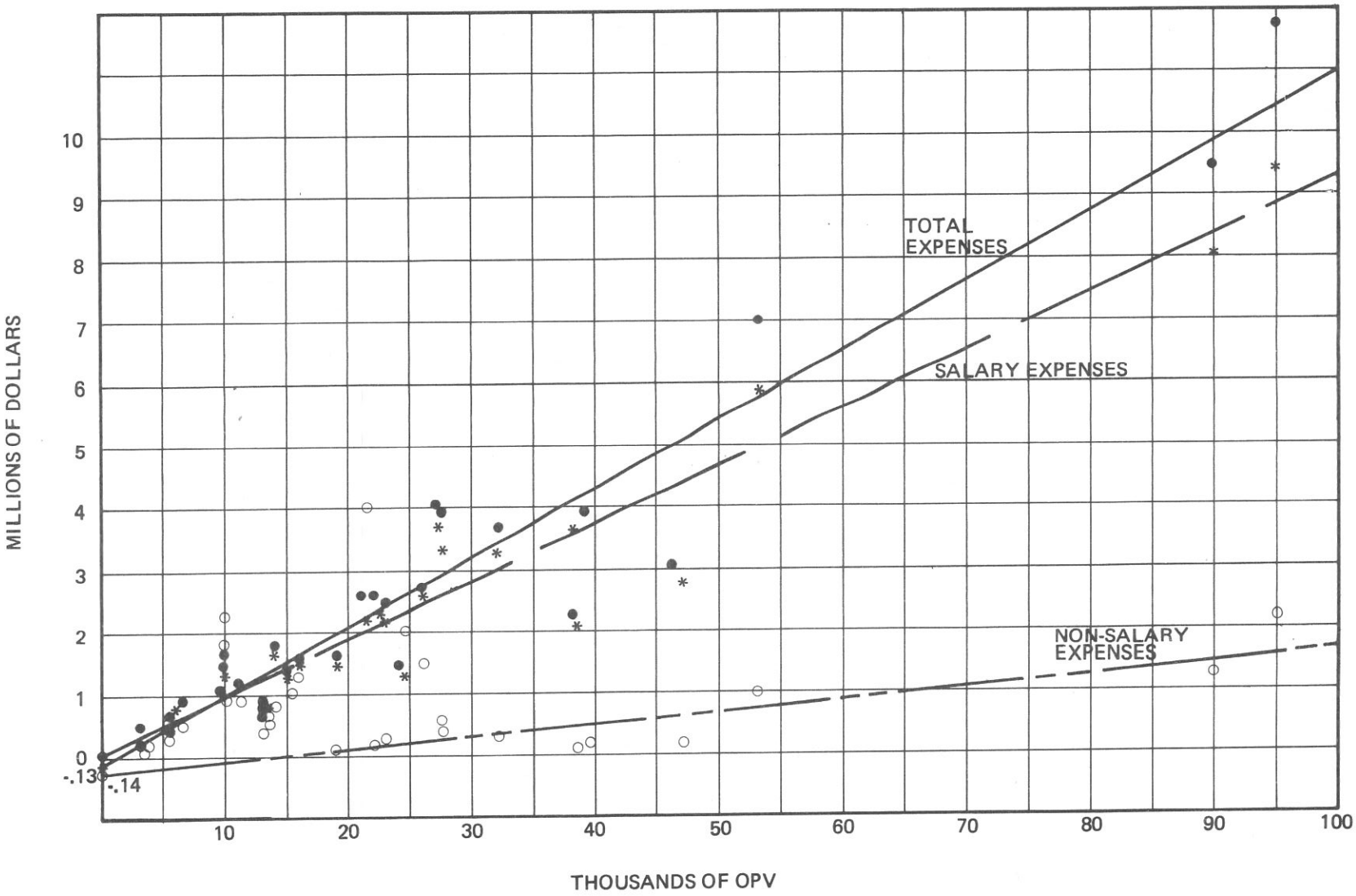


FIGURE 3-12 THE COST OUTPUT RELATIONSHIP FOR OUTPATIENT CARE (EQUATIONS 11, 12, 13)

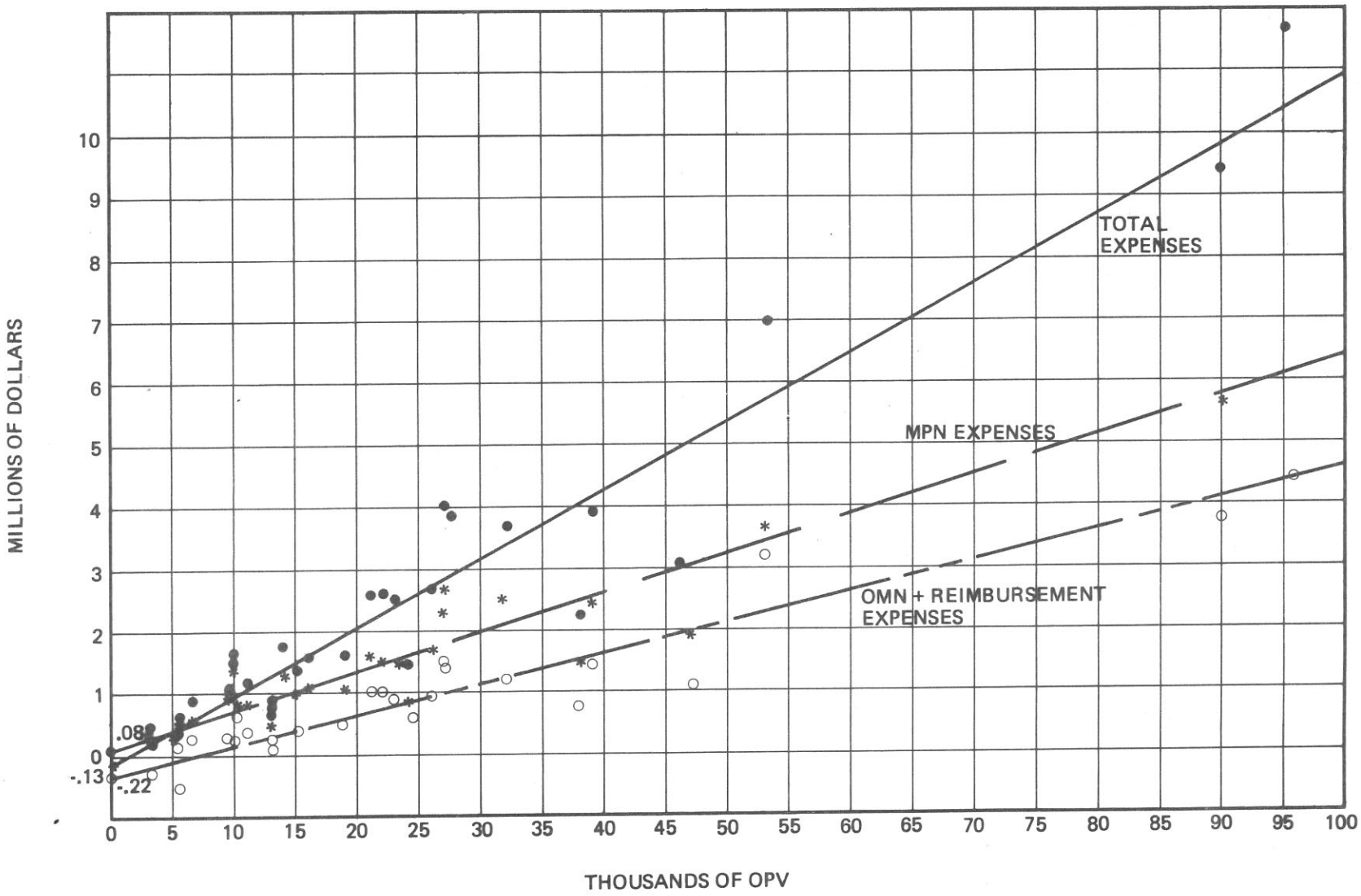


FIGURE 3-13 THE COST-OUTPUT RELATIONSHIP FOR OUTPATIENT CARE BY APPROPRIATION CATEGORY (EQUATIONS 11, 14, 15)

warrant a renewed general discussion until a specific scenario is described to which these unit costs need to be applied. Current rates of inflation would soon invalidate any new prices reported here. The data sources that were referenced in our earlier work are still available from OCHAMPUS.

3.2.4 Care In Non-Service Facilities

The marginal cost for care in non-service facilities is also equal to the average cost of the price of care in other Federal hospitals. These prices are administratively imposed and as a result need not be estimated. Currently the transfer prices are as follows:

Source of Care	Charge
Inpatient	
VA	
Acute Care	$88/day
Mental Care	$50/day
Nursing Care	$36/day
PHS, HEW	
Acute Care	$98/day
DOD	$133/day
Outpatient	
VA	$30
PHS, HEW	$20
DOD	$16

3.2.5 Dental Services

Workload data for dental clinics is not readily available. However, at our request BUMED has provided us with the three-quarter summary for nine of the dental clinics. Excluded from this list is the Naval Regional Dental Center at Portsmouth and the Naval Dental Center at San Diego. The data for these centers are not consistent with those for unregionalized clinics. We have summarized this workload data as well as the three-quarters expenditures (taken from Appendix F) on Table 3-14. Using cross-sectional regression analysis we have estimated the marginal cost of a dental sitting

TABLE 3-14

WORKLOAD AND EXPENSES AT DENTAL CLINICS
FY74,Q1 – Q3

DENTAL UNIT	DENTAL SITTINGS	DENTAL PROCEDURES	THOUSANDS OF DOLLARS TOTAL$	MPN	OMN
CPEND	79480.	259649.	1444.484	1281.023	163.461
LBEAC	40398.	154673.	840.727	736.253	104.474
PEARL	54171.	184920.	1231.918	1007.270	224.648
PHILA	22170.	74918.	490.711	418.259	72.452
WASH	55295.	194769.	1346.520	1204.032	142.488
CHAST	37622.	112521.	617.970	483.958	134.012
NWPRT	28261.	85852.	684.304	560.150	124.154
GUAM	23523.	68763.	447.496	383.346	64.150
GTMO	18773.	55433.	357.942	343.668	32.274

to be $19.56 (see Equation 16). The fixed cost is $50,360, which adjusted to an annual rate is approximately $67,000. The value of R^2 indicates that 89 percent of the variance of the total expenses was explained by Equation 16. The coefficient of dental sittings is highly significant. These marginal costs have been disaggregated into appropriation categories in Equations 17 and 18. Equation 17 indicates that of the total marginal costs $17.31 was accounted for by MPN dollars. The remaining $2.23 results from OMN expenditures.

16) $\text{TOT\$} = \$50{,}360 + \underset{(t=8.16)}{\$19.56\ (\text{Sittings})} \qquad R^2 = .89$

17) $\text{MPN\$} = \$21{,}462 + \underset{(t=7.88)}{\$17.31\ (\text{Sittings})} \qquad R^2 = .88$

18) $\text{TOT\$-MPN\$} = \text{OMN\$} = \$28{,}898 + \underset{(t=3.16)}{\$2.23\ (\text{Sittings})} \qquad R^2 = .53$

The average cost per dental sitting is $20.74. Equations 16 through 18 are graphed on Figure 3-15.

3.2.6 Training

As was pointed out earlier one of the costs of training an individual is the expense for the trainee's down time. In fact as Table 3-16, Cost of Hospital Corps Schools, indicates this expense dominates all others, generally requiring approximately 80 percent of the resources. This point is made even more clearly by the graph Figure 3-17, Estimated Cost of Corpsman Training. While the MPN expenditures for staff and OMN have been relatively fixed over the five-year interval plotted, the MPN expenditures of the student's time have varied in direct proportion to the number of students. Hence, from this data it is appropriate to conclude that the actual cost of operating the school is almost entirely a fixed cost. However, the marginal cost, which is very significant relative to

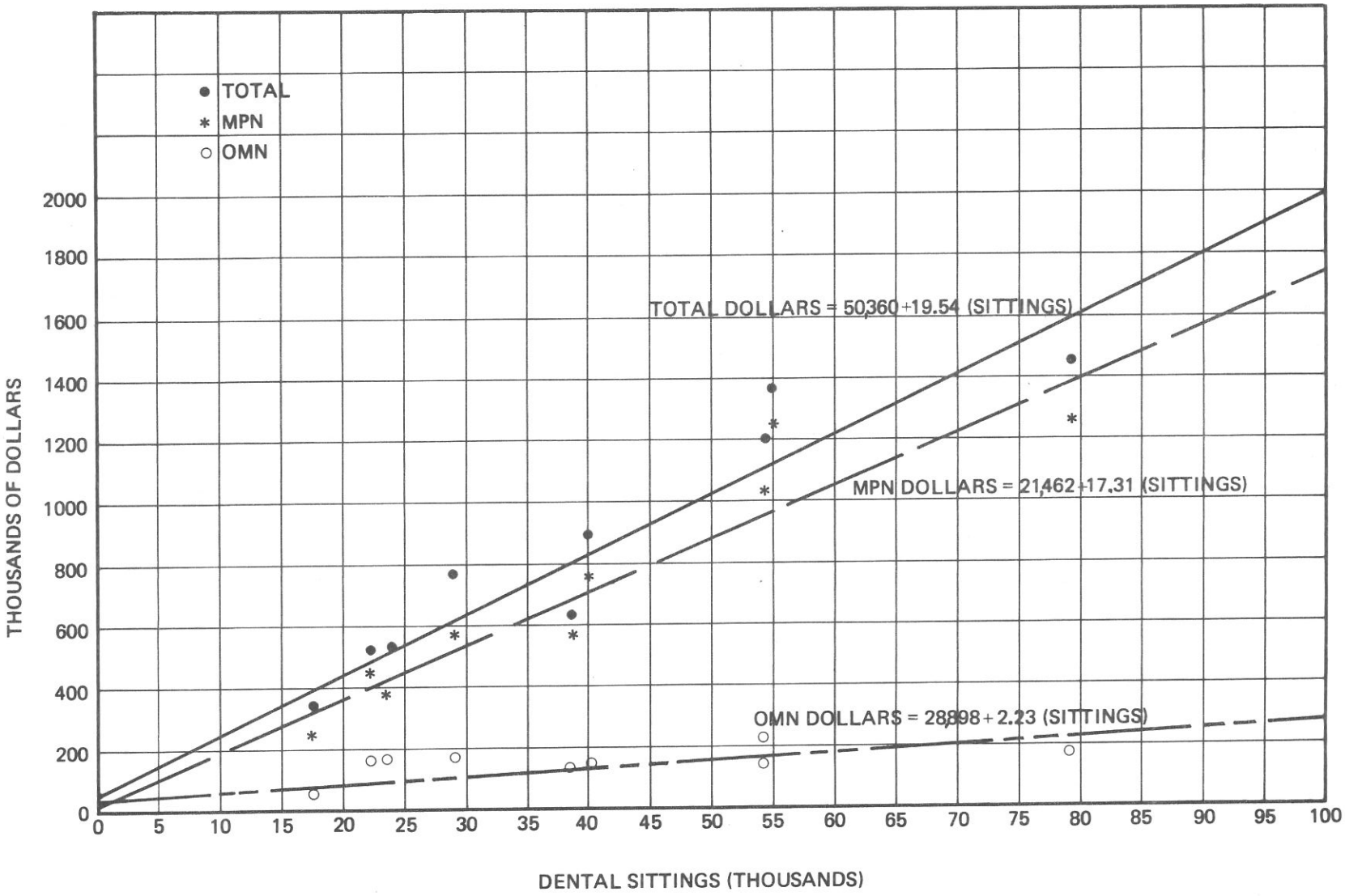


FIGURE 3-15 THE COST-OUTPUT RELATIONSHIP FOR DENTAL CARE BY APPROPRIATION CATEGORY

TABLE 3-16

COST OF HM CORPS SCHOOLS (THOUSANDS OF DOLLARS)

	FY71	FY72	FY73	FY74	FY75
GREAT LAKES					
LOAD	872	944	991	1069	678
MIL M/Y	74	74.5 (est)	75	82	88
OMN	140	131	114	151	156
MP,N (STAFF)	874	912	1135	1241	1332
MP,N (STUDENT)	3145	4606	6147	6631	4206
TOTAL	4159	5649	7396	8023	5694
SAN DIEGO					
LOAD	951	975	1096	1446	1033
MIL M/Y	93	96 (est)	99	112	124
OMN	154	196	243	240	245
MP,N (STAFF)	1099	1175	1425	1612	1785
MP,N (STUDENT)	3430	4757	6798	8970	6408
TOTAL	4683	6128	8766	10822	8438
TOTAL HM					
OMN	294	327	357	391	401
MP,N (STAFF)	1973	2087	2560	2853	3117
MP,N (STUDENT)	6575	9363	12945	15601	10614
GRAND TOTAL	8842	11777	15862	18845	14132

Source: OSD/OMB Submits and NMIS

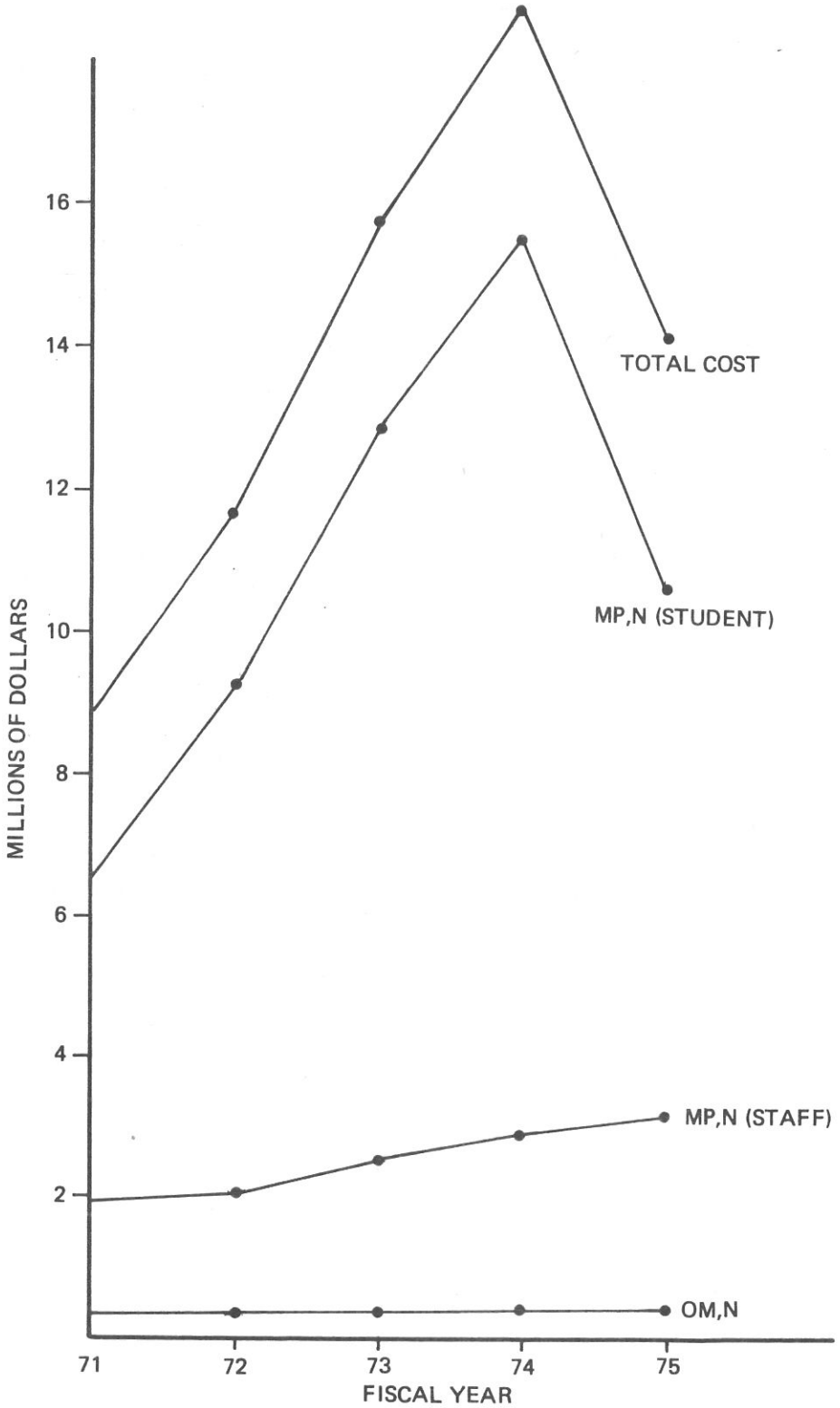


FIGURE 3-17 ESTIMATED COST OF HM TRAINING

the magnitude of the fixed cost, is just the composite rate. That is, if one more student is added to the school the increase in cost is just a composite rate times the period the individual is in training. Our estimate of the composite rate for students at the corps schools is $6203 per student year. It is based on a weighted average of the rates of students at San Diego and Great Lakes as of 31 December 1973. Professional training at service schools (Pensacola and Bethesda) can be similarly analyzed with comparable results. Again the fixed cost is that of operating the school. Beyond that the marginal costs are those associated with the value of the students' time. Our estimate of this marginal cost for FY 1974 was derived from a weighted average of the rank of the individuals undergoing professional training. It is equal to $12,017 per student year.

The other training method is to purchase services directly from the civilian sector. There are many alternative contractual arrangements employed to pay the student as well as his tuition and book expenses. These vary from a stipend and scholarship to the assignment of active duty personnel to civilian teaching institutions. A useful summary of these contractual arrangements can be gleaned from the OSD/OMB Submit, the relevant portion of which we have included here as Table 3-18. We do have more detailed data in our files and BUMED can readily supply executive summaries of their training at civilian institutions to those who inquire.[1]

1. The Health Personnel All Volunteer Task Force is currently engaged in a study to identify the cost-effective methods of professionally training an individual. That is, there are alternative methods by which BUMED has successfully recruited and/or retained individuals with various skills. The Task Force's study will identify which of these methods obtained skilled individuals at the cheapest long-run cost to the military.

TABLE 3-19

CONTRACTED TRAINING ARRANGEMENTS

Claimant: SCN
Prepared By: MRC D. E. Frasier
Phone: 254-4280

Department of the Navy
OPERATIONS, NAVY

Source FY 1975 OSD/OMB Submit

Section 3. Professional Training

	FY 1973				FY 1974				FY 1975			
	Mil Pay	O&M ($000)	Mil MY	AOB	Mil Pay	O&M ($000)	Mil MY	AOB	Mil Pay	O&M ($000)	Mil MY	AOB
1. Service Operated Schools												
Instructors			382				578					436
Students		1967				2182				2410		
TOTAL		4412		1955		9323		2897		11103		2948
2. Civilian Institutions		1979		1045		6319		2134		6811		2147
a. Graduate Level												
(1) Medical												
(a) Residencies (MC)		60		53		67		53		75		53
(b) Residencies (DC)		60		30		66		30		75		30
(c) Supply & Administration, Medical Allied Science (HSC)		78		21		132		51		98		25
(d) General Nursing (NC)		87		63		100		60		134		79
(e) Anesthesia Program (NC)		20		10		25		10		--		-
(f) Medical Officer Scholarship Pgm		469		250		519		250		519		250
(g) Dental Officer Scholarship Pgm		120		40		120		40		120		40
(h) Armed Forces Health Professions Scholarship Program		1085		430		5290		1575		5790		1575
(i) Senior Optometry Program		-00-		10		-00-		10		-		-
(j) Senior Medical Student Program		-00-		133		-00-		55		-00-		55
(k) Ensign 1935 Program (HSC)		---		--		---		---		-00-		40
b. Undergraduate		943		883		1008		735		1348		753
(1) Officer		35		20		-0-		-0-		38		25
(2) Enlisted		908		863		1008		735		1310		728
Student Nurse Program		798		843		800		635		800		526
(OCM Funded)		798		643		800		526		800		526
(SCN Only)				172				109				---
Physician Assistant Program		100		43		200		96		500		197
Enlisted Dietetic Program		10		5		8		4		10		5
c. Short Courses		106		27		176		28		211		48

Exhibit OP-14

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4.0 SUMMARY AND CONCLUSIONS

Chapters 2.0 and 3.0 provided the data and the analysis that can be used in future programming of U. S. Navy medical resources. However, the data employed in the analysis, and presented both in this main report and in the accompanying appendices, were based on a peacetime situation. We do not know how the resources would be distributed in the event of a mobilization. Certainly this information should be garnered in the immediate future, especially in light of the present clamor to reduce the size of medical departments because of inflation in the cost of these resources. However, that analysis will probably specify the bounds over which the inventory of medical resources can be allowed to vary and how the distribution of resources would change. It will specify a minimum size for each medical department. The costs of altering the size of the department, however, should continue to vary as we have described in Chapter 3.0. Hence, while further analysis is required, the fact that it has not been completed to date does not invalidate our findings.

We also disclaim any credit for estimating the production function of the Navy hospitals. Rather, we have described how they have been funded in the past. We have not attributed any of the marginal output to a specific resource, and have not included the impact of capital in the definition of any of our models. To do so would require detailed examination of a representative sample of Navy medical regions to evaluate, among other factors, the capital/labor trade-off. We have recommended in the past that this research be funded. We still believe that reorganizing the resources and/or increased amounts of capital may enable BUMED to provide

quality medical care at a lower operating expense. Further analysis could verify or refute this thesis.

Chapter 2.0 includes the data that should be used to forecast the level of demand. Our estimates are based solely on the population. The population itself is defined into four large beneficiary groups. If subdivisions of these groups can be identified and utilization rates for each calculated, better estimates can be made. Some of the data that would be required for this analysis may become available if enrollment of the beneficiary population is found to be feasible. Currently OSD(HE) is funding a study that may provide some of these answers.

Among the left-out variables that affect the level of demand (other than the demographic characteristics, which are a function of the population itself) is the impact of price. This is important not only because in the future the Navy may want to attempt to control the demand for out-patient care, but also due to the cost sharing provisions of CHAMPUS. If care in Navy hospitals is unavailable to entitled beneficiaries, the civilian sector will have to supply the services. However, we can anticipate a reduction in demand due both to the deductible ($50 per beneficiary or a maximum of $100 per family) and the co-insurance (20 percent of the cost for dependents of active duty personnel, 25 percent for other entitled beneficiaries), when the consumers begin to pay a portion of their medical costs. The consensus is that co-insurance rates of this amount will imply a 25- to 35-percent reduction in the level of effective demand. The impact of the deductible will be a large amount of unreported care.

While we believe that the current method of estimating future demand will provide satisfactory results, it can be improved by more narrowly defining the population and by specific incorporation of price effects. A guide for future research would be to compare the experience of the Navy, or CHAMPUS in particular, to that of fee-for-service health insurers in the private sector, primarily the major indemnity health insurers. This would require CHAMPUS reporting definitions that are consistent with those employed in the civilian sector. Also the benefit package available in CHAMPUS probably would have to be subdivided into benefit packages available in the civilian sector: major medical, dread disease, psychiatric, etc.

Chapter 3.0 presented the total cost of producing the five final outputs of the health care delivery system: inpatient care, outpatient care, dental care, public health, and research. That chapter also described the fixed and marginal cost of producing additional units of the first three outputs. For inpatient and outpatient care these costs approximate those reported in Navy Medical Care Study - Cost and Economic Efficiency. They are somewhat lower however, as in that study we included the cost of retirement, the capital appropriated as OPN and MILCON, and we adjusted the composite rate to include the bonus for which physicians qualify. Here we did not. The financial impact of retirement is discussed in some detail in Appendix C.

A casual reading of our findings will not be sufficient to make someone an expert either at programming for future years or evaluating the implied financial changes of alternative scenarios. These are difficult tasks. First, the appropriation category must be considered. Our marginal cost

estimates have separated OMN and MPN appropriations. Second, there are ten program elements from which BUMED receives funding directly. Changes in resource requirements must be allocated not only among these ten elements, but also to some which are outside the sphere of BUMED's Five Year Defense Plan. Finally, one must explicitly take into account the impact of reimbursements and their source. All of this data is included in some form in Chapter 3.0 or the appendices referenced therein.

Once the level of demand has been estimated and the source of funds identified, application of the following formula will predict the resources required for each program element:

$$\text{Program Element \$} = \text{Fixed Cost} + \Sigma\,(\text{Workload}) + (\text{Marginal Cost}) - \text{Reimbursement}$$

when the sum is across all products produced. For example, in hospitals and medical centers the workload is that for dental, inpatient, and outpatient care. Marginal costs are stated in MPN and OMN dollars, which are separable using our estimates. Fixed costs are a function of the number of medical regions. Additionally there are two outputs, research and public health, that can be regarded as add-ons. The reimbursements should then be calculated to reduce the financial requirements of the program element.

Our work resulted in a conclusion that is peripherial to the study's goals: the information needs for both the day-to-day management and to satisfy the data requirements of numerous studies are unnecessarily

expensive, if they can be fulfilled at all. The current automated system is limited and inflexible; therefore much of the extraction and manipulation must be done by hand. A second problem is that much of the data is simply not available. Reporting and processing lags are sufficiently long that management must be based on intuition rather than hard data. This implies that a management crisis occurs each time a manager transfers or retires. A better information system featuring rapid response and adequate documentation would better satisfy both BUMED's requirements and those of study groups.

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO
Ser 96/587911
20 MAR 1976

From: Chief of Naval Operations
To: Distribution List

Subj: Boeing Computer Services, Inc. (BCS) Study, "Research on the Efficient Delivery of Medical Care in the U.S. Navy", ONR Contract No. N0014-73-C-0341, NRQ462-57; forwarding of

Ref: (a) CNO ltr ser 96/1396 of 25 July 1974 to Distribution List

Encl: (1) Navy Medical Care Study; Planning and Programming, Aug 1974
(2) Navy Medical Care Study; Planning and Programming Appendices, Aug 1974
(3) Navy Medical Care Study; Alternatives to a Physician Shortfall, March 1975

1. The subject study has been a three phased effort. Reference (a) promulgated the report of Phase I. Enclosures (1) and (2), Phase II of the study effort, examine Navy Medical Care Planning and Programming in an attempt to identify the driving factors that determine the level of output of health care services. Enclosure (3), the report of Phase III of the study, determines the feasibility and costs of alternative methods of delivering medical care to Navy beneficiaries in the event that the Navy Medical Corps is unable to maintain physician strength at current authorized levels.

2. Major findings of the Planning and Programming study (Phase II) are:

a. Current Navy medical workload projections based on size of beneficiary population segments are reasonably accurate. Accuracy could be increased by finer segmentation of beneficiary population data, e.g., recruit populations.

b. The Expense Operating Budget reporting system under-reports medical care costs to the extent that such reports exclude special incentive pays, training and administrative costs and do not provide for cost allocations related to intensity of care.

c. Navy medical care marginal costs are less than CHAMPUS prices (1974) excluding long term costs of training and capital. Thus, short-run shifts of medical care workload to CHAMPUS sources results in a rise in total cost to the government.

d. Long-run marginal costs of Navy medical care are comparable to CHAMPUS prices (1974). Thus a shift of medical workload could be cost effective in the long-run by reducing the number of military physicians but only at the expense of higher personal co-payment costs to beneficiary sponsors.

e. Overriding contingency requirements for medical resources must be quantified before "inhouse care" vs CHAMPUS alternatives can be addressed.

f. Further research should be done on the impact of capital resources on Navy health care.

3. Major findings of the alternatives to a Physician Shortfall Study (Phase III) are:

a. It will be technically difficult, if not impossible, to continue care for the current beneficiary population "in-house" in the event of a significant decrease in Navy physician strength.

b. Very few physicians presently involved in activities not associated with direct patient care could be usefully transferred to patient care.

c. The number of physician manhours which might be obtained by mobilizing the training and drill time of Reserve physicians is small, and use of those manhours would render them unavailable to the new unit Reserve structure.

d. Employment of civilian physicians appears to be potentially feasible, but because full-time Civil Service physicians would receive lower pay than uniformed physicians, they may be even more difficult to recruit. In addition, employment of these physicians might lead to personnel problems in the outyears as the Medical Corps regained its strength. The employment of physicians on part-time contracts was found to be a questionable practice in the eyes of the Civil Service Commission and may not be permissible; even if it were, the study indicates that the appropriate manpower would not be readily available at the right time in the right place and at the right price.

e. The most viable alternatives technically appear to be those which involve diverting the beneficiary population to the civilian sector during the shortfall period, either through CHAMPUS and/or by enrollment in Health Maintenance Organizations (HMO) (which probably would also be administered through CHAMPUS). Enrollment in CHAMPUS, particularly, has the advantage of being readily reversible.

f. The HMO alternative has the advantage of providing a similar level of care to that currently received in Navy facilities at lower government cost and little or no additional cost to the beneficiary (CHAMPUS involves substantial deductibles and co-insurance). Such enrollment, however, would require enabling legislation; furthermore HMO's currently are not widely established in all parts of the country, and thus would not be available to all Navy beneficiaries.

4. The following comments should be noted when reviewing these reports:

a. The Phase II study is based on partial year resource data only.

b. Some of the alternatives and proposals advanced would require DOD or other higher authority approval prior to implementation.

c. The studies make no definitive assessment of the effect of increased beneficiary sponsor costs on all volunteer force recruiting and retention rates.

d. The Phase III report concludes that the most viable alternative to continue care for current beneficiary population is "...either through CHAMPUS and/or by enrollment in HMO's...." The report goes on to say, "The HMO alternative has the advantage of providing a similar level of care to that currently received in Navy facilities at lower government cost and little or no additional cost to the beneficiary...." It is believed that further in-depth analysis is necessary to support this conclusion.

e. The most recent experience and potential of ongoing physician recruitment and retention programs suggest that the Navy will obtain sufficient physicians to meet the needs of eligible beneficiaries.

f. The study clearly points up the inherent problems in trying to predict personnel levels, and it demonstrates the sensitivity of forecasts to relatively small changes in any one of the many variables which make up the sources of gains and losses for physicians.

5. Enclosures (1) through (3) are forwarded for information.

D. C. DAVIS
Director
Navy Program Planning

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